Case No.

469

Application, Transcript,
Small Exhibits, Etc.

CASE 469: Neil H. Wills, et al, application for approval secondary-recovery project (by water flooding), 20S, 28E, Eddy County, N.M.

NEIL H. WILLS ET AL

PRELIMINARY WATER FLOOD SURVEY

RUSSELL POOL
EDDY COUNTY, NEW MEXICO

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WATER FLOODING CORE ANALYSIS GAS REPRESSURING

TELEPHONE - 3-2167

PETROLEUM ENGINEERS
CABLE ENGINEERING
WICHITA FALLS, TEXAS

POST OFFICE BOX - 2249

WICHITA FALLS, TEXAS

December 5, 1952.

Mr Neil H. Wills Et Al,
P. O. Box 529,
Carlsbad, New Mexico.

Dear Mr Wills:

Pursuant to your request, we submit herewith a preliminary water flood survey of your oil producing properties in the Russell Pool, Eddy County, New Mexico.

We have examined all available data including core analysis, well logs, production records, isopach and structure maps, and repressuring history.

Our conclusions are as follows:

1) The ultimate recoverable oil from all leases by present producing methods will be approximately 990,208 gross barrels. The future recoverable oil by present producing methods as of November 1, 1952 will be approximately 163,500 gross barrels.

2) From production history, the Russell Pool appears to be adaptable to water flooding if old gas input wells are not used for water injection.

3) Pilot flooding is the most feasable method of determining the floodability of the field.

4) If pilot flooding is succesful, the entire field should yield approximately 900,000 gross barrels of water flood oil in addition to the ultimate recovery by present producing methods.

Our recommendations are as follows:

1) The George Turner No. 5 well should first be recompleted in the 900-foot limestone as a source of flood water.

2) A pilot flood should be initiated as described in this report at a cost of $ 24,241.00.

3) If pilot flooding proves sufficiently beneficial, a complete flood should be initiated at an additional cost of $ 59,231.00.

We will be pleased to discuss this report with you at your convenience.

Yours very truly,

CABLE ENGINEERING,

Roger Lewis

Roger Lewis.

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WICHITA FALLS, TEXAS

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RUSSELL POOL
EDDY COUNTY, NEW MEXICO

PURPOSE

The purpose of this report is to determine the most feasable pilot water flood program for the Russell Pool, Eddy County, New Mexico.

LOCATION

The Russell Pool is located in the Southeast quarters of sections 12 and 14 and in section 13, Township 20 South, Range 28 East, Eddy County, New Mexico, approximately twelve miles northwest of Carlsbad.

HISTORY & GENERAL INFORMATION

The Russell Pool was discovered in March 1945 with the completion of Wills et al Number 1 in the southwest quarter of Section 13 for an initial production of 29 barrels per day. This lease is also designated as the South Battery lease. The productive formation, Yates Sand, was topped at 786 feet and casing set at 737 feet.

The pool has been developed rather slowly because pipe line facilities were lacking in this area. The Artesia Pipe Line Company completed a gathering system in 1946. The last well producing was completed in August 1948.

The field has been gas repressured since July 1949 with success as can be seen from individual lease decline curves. The average gas-oil ratio at the inception of gas repressuring was 1200-1400 cubic feet per barrel and at the

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HISTORY & GENERAL INFORMATION (Cont'd)

present time is approximately 3000 cubic feet per barrel.

The Yates sand, Permian in age, is penetrated at approximately 800 feet in depth. The structural features controlling the accumulation of oil is primarily a monocline with a small closure near the center of Section 13. The gross thickness of the producing sand ranges from zero to approximately 40 feet, but averages approximately 20 feet.

The gravity of the oil ranges from 36 to 38 degrees API and has a viscosity of 5.7 centipoise at 92 degrees Fahrenheit. This viscosity is favorable for flooding.

DRILLING AND COMPLETION

The wells were drilled with a rotary rig and pipe set approximately 50 to 100 feet above the saturation and completed with cable tools which includes a heavy shot with subsequent cleaning out as part of the completion work. The approximate cost of drilling each well is $7,000.00

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COMPLETION RECORDS
WILLS ET AL-NORTH AND SOUTH LEASES

Well No.	Elev.	Top Pay	Est. Sat. Thick-ness	Csg. Seat	Total Depth	Init. Produc-tion	Completion Date	Elev. Top Pay	Remarks
1	3250	786	20	737	906		3-25-42	2464	Sand
2	3244	785	24	756	810	29	4-5-42	2459	Sand
3	3253*	817	20	780	844	45	8-22-43	2436	Sand
4	3253	780		736	873		9-13-44	2473	Base Sand 810'
5	3255	836	30	770	856		1-15-45	2427	
6	3247	803	26	735	829		4-6-45	2444	Sand
7	3253	815	18	752	839		3-17-45	2438	Sand
8	3256	860	17	740	878		5-2-45	2396	Sand
9	3253	864	0	800	880		6-14-45	2389	Sand
10	3249	780	25	740	807		6-25-45	2469	Sand
11	3255	840	25	733	867	59/5 Hrs	9-21-45	2415	Sand 217' Liner Cemented
12	3248	800	23	689	825	48	2-5-46	2448	Sand
13	3242	772	21	657	797	45	2-21-46	2470	Sand
14	3240	756		655	993	Gas	7-17-46	2484	Show Oil Sat. Low
15	3241*	764	13	662	784	36	7-30-46	2477	Sand
16	3241*	795	16	681	812	45	8-16-46	2446	Sand
17	3241*	778	20	679	808	15	9-30-46	2463	Sand
18	3241*	765	16	668	782	12	8-28-46	2476	Sand
19	3252	820	26	775	849	36	6-29-47	2432	Sand
20	3253	824	21	717	847	15	7-7-47	2429	Sand
21	3254	832	16	732	854	40	7-20-47	2422	Sand
22	3256	846	21	749	870	50	7-29-47	2410	Sand
23	3258	860	23	752	883	40	8-9-47	2398	Sand

* Estimated

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COMPLETION RECORDS
GEO. TURNER-SOUTH-MIDDLE-NORTH LEASE

Well No.	Elev.	Top Pay	Est. Sat. Thick-ness	Csg. Seat	Total Depth	Init. Produc-tion *	Completion Date	Elev. Top Pay	Remarks
1	3245	795	12	712	908	22	9-14-42	2450	Pay, Sandy Lime
2	3250	814	18	724	873	36	10-26-42	2436	Pay - Sand
3	3250	841	21	723	869	50	2-25-43	2409	Pay - Sand
4	3250	790	25	725	815	100	4-7-43	2460	Pay - Sand
5	3240	842	0	710	1028	Dry	6-3-43	2398	Water Below 855'
6	3252	826	19	732	850	50	9-4-43	2426	Sand
7	3248			714	808	50	9-23-44		Lime
8	3250	787	26	702	814	60	10-24-44	2463	Sand
9	3252	824	23	728	850	60	1-25-45	2428	Sand
10	3250	841	29	706	870	60	5-1-45	2409	Sand
11	3250	788	26	803	813	50	5-25-45	2462	Sand
12	3250	826	24	767	852	82	7-30-45	2424	Sand
13	3256	831	14	745	847	80	6-19-46	2425	Sand
14	3250	804	27	712	835	80	7-14-46	2446	Sand
15	3242	789	19	695	810	30	9-16-46	2453	Sand
16	3252	797	27	731	826	50	11-27-46	2455	Sand
17	3250	823	20	728	843	40	2-20-47	2427	Sand
18	3252	799	30	734	829	150	4-2-47	2453	Sand
19	3250	799	34	716	834	150	5-12-47	2451	Sand
20	3250	795	27	696	824	60	7-9-48	2455	Sand
21	3250	789	30	686	820	40	7-17-48	2461	Sand
22	3250	846	22	742	868	30	8-6-48	2404	Sand
23	3250	790	13	682	804	40	7-24-48	2460	Sand

* Estimated

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COMPLETION RECORDS
CROSBY LEASE

Well No.	Elev.	Top Pay	Est. Sat. Thick-ness	Csg. Seat	Total Depth	Init. Produc-tion	Completion Date	Elev. Top Pay	Remarks
	3256	844	37	751	881	100*	12-3-44	2412	Sand
	3260	836	43	775	908	124*	3-23-45	2397	Water 60%
	3260	896	6	795	900	dry	5-29-45	2364	Water 89%
	3256	867	19	746	890	50*	6-18-48	2389	Sand

Estimated.

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24-HR INDIVIDUAL WELL TESTS

Original Owner & Well Number		Oil Bbls	Water Bbls	Gas Cu Ft	Gas/Oil Ratio	Csg. H. Pres.
Neil H. Wills Et Al	4	No Tests				
	5	4.5	0	16,000	3555	12
	6	2.0	0	5,000	2500	10
	7	2.0	0	13,000	6500	12
	8	4.5	0.5	4,000	888	10
	10	2.5	0	7,500	3000	10
	11	2.5	0	6,500	2600	11
	12	3.5	0	7,000	2000	12
	13	2.0	0	8,000	4000	9
	15	4.0	0	8,500	2125	10
	16	3.0	0	7,500	2500	10
	17	2.0	0	2,000	1000	10
	18	1.0	0	5,000	5000	10
	19	2.5	0	6,000	2400	10
	20	3.5	0	4,000	1142	10
	21	3.0	0	5,000	1666	10
	22	4.0	0	7,000	1750	10
	23	4.5	0.5	12,000	3272	10
Total		51.0	1.0	129,000	2554	
George Turner	7	1.0	0	4,700	4700	-
	8	3.0	0	10,500	3500	-
	9	1.5	0	4,500	3000	-
	10	2.0	0	22,000	11000	10
	11	2.0	0	12,500	6250	10
	12	4.0	0	10,500	2625	-
	13	1.0	0	4,500	4500	-
	14	4.0	0	7,500	1875	10
	15	2.0	0	5,500	2750	15
	16	4.0	0	28,000	7000	-
	17	1.2	0	4,700	3916	-
	18	3.5	0	18,000	5142	12
	19	3.5	0	10,000	2857	-
	20	No Test				-
	21	5.5	0	4,700	854	-
	22	2.5	0	5,800	2320	-
	23	0.5	0	3,000	6000	14
George Turner Crosby Lease	1	2.0	0	4,700	2350	-
	2	2.0*	52.0*	2,000*	1000	-
	4	1.5	0	4,000	2800	-
Total		46.7	52.0	167,100	3578	-
Field Total		97.7	53.0	299,100	3077	

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PRODUCTION RECORDS

Year	Month	Wills South	Wills North	Turner North, South & Middle	Turner Crosby	Total	Cumulative Total
1942		4615		320		4935	4935
1943		11259		18454		29713	34648
1944		17796		25953	450	44199	78847
1945		15996	29891	44153	10277	100317	179164
1946		20838	24650	47423	8972	101883	281047
1947		33079	38592	67900	9748	249319	430366
1948		25229	40543	57781	8189	131742	562108
1949		15441	29150	44470	6037	95098	657206
1950	Jan.	1047	2892	3555	436	7930	665136
	Feb.	860	2248	2932	312	6352	671488
	Mar.	952	2861	3294	493	7600	679088
	Apr.	1005	2822	3205	377	7409	686497
	May.	1462	2868	2953	411	7694	694191
	Jun.	1362	2886	2315	428	6991	701182
	Jul.	1368	2571	2411	278	6628	707810
	Aug.	1218	2351	2161	389	6119	713929
	Sep.	1142	2201	2229	278	5850	719779
	Oct.	1257	2254	2564	337	6412	726191
	Nov.	1207	2083	2103	301	5694	731885
	Dec.	1249	2110	2020	345	5724	737609
		14129	30147	31742	4385	80403	

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PRODUCTION RECORDS (Cont'd)

Year	Month	Wills South	Wills North	Turner North, South & Middle	Turner Crosby	Total	Cumulative Total
1951	Jan.	1167	1946	1852	281	5246	742855
	Feb.	932	1674	1875	283	4764	747619
	Mar.	1113	1718	2080	270	5181	752800
	Apr.	1016	1690	1799	353	4858	757658
	May.	920	1674	1889	229	4712	762370
	Jun.	902	1522	1856	243	4523	766893
	Jul.	863	1435	1771	244	4313	771206
	Aug.	792	1370	1812	242	4216	775422
	Sep.	734	1323	1704	219	3980	779402
	Oct.	866	1329	1723	190	4108	783510
	Nov.	770	1367	1780	187	4104	787614
	Dec.	813	1293	1708	225	4039	791653
		10888	18341	21849	2966	54044	
1952	Jan.	814	1191	1693	221	3919	795572
	Feb.	732	1164	1599	194	3689	799261
	Mar.	754	1172	1696	206	3828	803089
	Apr.	666	1127	1594	197	3584	806673
	May.	731	1168	1579	183	3661	810334
	Jun.	669	1071	1451	184	3375	813709
	July	603	1031	1557	207	3398	817107
	Aug.	613	998	1380	217	3208	820315
	Sep.	642	946	1361	203	3152	823467
	Oct.	697	892	1459	188	3241	826708
		6921	10765	15369	2000	35055	
Grand Total		398270		375414	53024	826708	

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ESTIMATE OF RECOVERABLE OIL by PRESENT PRODUCING METHODS

The estimate of recoverable oil by present producing methods was made by the production decline method. The total field production was plotted and the resulting curve was extrapolated on logarithmic paper to an estimated economic limit. We estimate the total future recovery by present producing methods from the Russell Pool to be 163,500 gross barrels as of November 1, 1952. The total ultimate recovery by present producing methods for the field will be approximately 990,208 gross barrels. The estimated future and ultimate recovery by leases is tabulated in the recapitulation.

The average recovery from the Russell Pool as of November 1, 1952 is 97.1 barrels per acre-foot. The Wills north battery has recovered 109.7 barrels per acre-foot while the other areas of the field have recovered approximately 90 barrels per acre-foot. The present and ultimate recoveries per acre-foot by present producing methods for the Wills-North, Wills-South, Turner-North, South and middle, and Turner-Crosby leases are shown in the recapitulation. These recoveries were based on gross rather than net sand volume and therefore seem quite low for sand production.

Our original estimate of recoverable oil by primary production and repressuring which was made in 1948 during

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ESTIMATE OF RECOVERABLE OIL
by
PRESENT PRODUCING METHODS (Cont'd)

flush production was 1,151,167 gross barrels. The estimate made at this time of 990,208 gross barrels incorporating the production history since 1948 is more reliable.

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ESTIMATE OF RECOVERABLE OIL by WATER FLOODING

An important item of information necessary in planning a large scale water flood and predicting the recovery therefrom is core analysis data. Sufficient core analysis data are lacking in this field to make predictions which will be of great value. The single core analysis from the Wills et al No. 26 well, which was cored with oil base mud to determine the existing water saturation in the sand. The analysis showed the core to have an average water saturation of 47.4 percent. This water saturation is higher than ordinarily exists in sands which can be succesfully flooded. However, this core showed some shale which may have given up some water when heated to retort temperature.

A pilot flood will be the most reliable method of determining the floodability of this field and for obtaining an idea of what additional recovery can be expected. It is not uncommon in succesful water flooding to recover as much oil as was possible by all other methods of production.

As no significant volume of water has been produced to date, the high water saturation reported by core analysis could easily be in error. If this flood is succesful, the additional recovery by water flooding should be approximately 900,000 gross barrels.

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RECAPITULATION OF RECOVERABLE OIL

	Oil Prod. as of 11-1-52	Est. Future Recv. by Pres. Prod. Methods as of 11-1-52	Ult. Recv. by Present Producing Methods	Sand Vol. Ac. Ft.	Prod. Area Acres	Recovery as of 11-1-52 Bbl/Ac.	Recovery as of 11-1-52 Bbl/AcFt	Ult. Recovery Pres. Prod. Methods. Bbl/Ac.	Ult. Recovery Pres. Prod. Methods. Bbl/Ac.Ft.
Russell Pool	826,708	163,500	990,208	8511	442	1870	97.1	2240	116.3
Wills-North	242,281	48,381	290,662	2209	113	2144	109.7	2572	131.5
Wills-South	155,989	33,241	189,230	1729	102	1529	90.3	1855	109.6
Turner-North, South and Middle,	375,414	71,524	446,938	3965	192	1955	94.7	2328	112.7
Turner-Crosby	53,024	10,354	63,378	610	34.4	1541	86.9	1842	103.9

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RECOMMENDED PILOT FLOOD PROGRAM

As the character of the Yates sand is different in the southern part of the Russell Pool than in the central and northern part, it will be advantageous to test the floodability of both areas by pilot injection. We believe that a 20 acre 5-spot will be the most profitable pattern as no additional wells will have to be drilled for input purposes. Although this pattern is quite wide for flooding a sand only 800 feet deep, it has two distinct advantages in this particular field. First, a 20 acre 5-spot pattern will minimize the danger of water channeling through streaks of high gas saturation that have contributed to the abnormally high gas-oil ratio history. Second, this pattern will allow the gas injection wells to remain in service while water flooding which could not be done on the closer 10 acre 5-spot pattern. Due to the high gas-oil ratios in this field, the present gas injection contributes as much reservoir energy as will be possible to gain by water flooding. Of course, gas has not the oil displacing ability that water has, but from a standpoint of maintaining pressure and thereby reducing the volume of water necessary, it is just as valuable. The chief disadvantage to the wide spacing is that less water can be injected because fewer input wells will be incorporated. This disadvantage may be overcome by drilling producing wells in the virgin areas between water

RECOMMENDED PILOT FLOOD PROGRAM (Cont'd)

input wells if the flooding progress proves to be too slow. Drilling additional producing wells between water input wells will alter the pattern to a 10 acre 5-spot, but will not necessitate injecting water into old gas injection wells. We recommend that the flood be begun on the wider spacing which is 660 feet between unlike wells and 933 feet between like wells. This will result from converting alternate producing wells to water input wells.

As a pilot injection project we recommend converting the following six producing wells to water input wells as shown on the field map: Wills et al Nos. 6, 10, and 17 and George Turner Nos. 8, 12, and 14. Thus, two complete 20 acre 5-spot will be obtained with the Wills No. 12 and the Turner No. 19 being the producing wells which will be affected by a 4-way drive. The Wills No. 12 is a typical well in the southern portion of the field which is the less prolific area, and the Turner No. 19 is a typical well in more prolific area which includes the central and northern portions of the field. During the flush production of 1948 the Wills No. 12 and the Turner No. 19 produced 7 and 13 barrels per day respectively. At the present time these two wells each produce approximately 3 barrels per day.

The current gas injection program should be continued during either pilot or complete flooding as long as there is gas available.

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RECOMMENDED PILOT FLOOD PROGRAM (Cont'd)

A reasonably long pilot injection period can be expected due to the wide spacing recommended. We estimate that a maximum injection period of one year will be necessary before a production increase will be noted. This estimation is based on the assumption that an injection rate of 1000 barrels per day is maintained during the pilot flood. If an increase in production does come relatively late, it will be a good indication that channeling will not be excessive.

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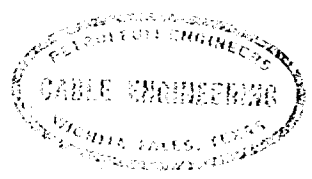
WATER FLOOD FACILITIES

It is quite probable that an open injection system will be necessary due to the high concentration of hydrogen sulphide which is commonly found in the 900 foot lime in this area. The cost estimate and plant design in this report are for an open system.

The pilot plant will be so constructed that expansion to a capacity sufficient for fieldwide flooding will be possible with a minimum of additions and alterations. It will be necessary to install additional water pumping, filtering, and storage capacity for plant expansion, but the basic plant layout will remain the same. The high pressure water mains extending northeast and southwest from the plant will remain the same. The injection lines should be cement lined seamless pipe and the water return lines should be cement lined or plastic pipe. The proposed location of these lines are shown on the field map. Water return lines will not be necessary in the pilot flood and therefore were not included in the pilot flood cost estimate.

It will be advantageous to operate the water source well or wells on electric power and the high pressure pumping equipment with gas power. Gas power gives greater flexibility which is needed to regulate the injection rate but is



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WATER FLOOD FACILITIES(Cont'd)

not greatly needed in the source well power when using an open system. The long range, overall economy of the two power sources do not differ greatly.

Heater gun barrels will eventually be needed on all batteries if water flooding is found to be practical. These heaters may be of the atmospheric-type except on the Wills et al south battery. This battery should be equipped with a pressure-type heater because the elevation is too low for produced water to flow by gravity to the injection plant.

The converted water input wells should each be capable of taking approximately 150 barrels per day without exceeding the breakdown pressure of the formation. Therefore, the pilot injection plant is designed with a capacity of 1000 barrels per day and full scale plant should have a capacity of approximately 3500 barrels per day.

A general diagram of the pilot water injection plant is included in this report.

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CONVERSION OF PRODUCING WELLS TO INPUT WELLS

After rods and tubing have been removed from the wells being converted, the wells should be cleaned out as well as possible. Each input well should be gravel packed from bottom to a heighth of about 10 feet into the casing to prevent exposed shale from heaving into the well. Well washed, coarse gravel (1/2-inch) should be placed opposite the sand filling the shot hole and well washed, medium sized (1/4-inch) gravel should be used to cover the exposed shale. To assure that the proper amount of each size gravel is placed in the well, a baler should be run to bottom periodically during the gravel packing operation to determine the heighth to which the hole is being filled. Gravel should stand about 10 feet into the casing, but excess gravel will cause excessive flow friction.

COMPLETION OF SOURCE WELLS

One well completed in the 900-foot limestone should provide ample water for the pilot flood operation. The top of the lime section should be cored to determine the presence of oil saturation. Any non-commercial oil production with the flood water would be most troublesome and should be cased off.

The Turner No. 5 well which was dry in the Yates, but has casing set at 710 feet. This well may be deepened to the

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COMPLETION OF SOURCE WELLS (Cont'd)

water bearing strata and completed with a liner cemented from 710 feet to bottom. A liner will reduce the turbidity of the water and will eliminate oil production from the Yates or the 900-foot lime.

The well should be treated with 1000 to 2000 gallons of acid depending on the thickness penetrated and the natural productivity of the well. The well should be swabbed for several hours after completion to determine its producing capacity prior to selecting pumping equipment.

Other dry holes having casing set are the Wills et al No. 9 and the Crosby No. 3 which may also be recompleted as water producing wells later if needed.

The Turner No. 5 should be recompleted as a water source well as the initial step in the proposed pilot flood program. This is necessary as an analysis of the water is necessary before construction of the water plant can be begun.

REMEDIAL WORK ON PRODUCING WELLS

After water production becomes significant, some trouble may occur from caving due to the interval of exposed shale between the casing shoe and the top of the sand. If this occurs, it may be necessary to set liners

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REMEDIAL WORK ON PRODUCING WELLS (Cont'd)

in producing wells where this trouble is excessive. Producing wells to be converted to input wells should be gravel packed through the exposed shale section.

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FACILITIES AND COST ESTIMATE FOR PILOT FLOOD

6 - Input wells cleaned out and gravel packed, @ $300.00 each	$ 1,800.00
1 - Water source well recompleted in the 900-foot ~~limestone~~ and equipped to pump 750-1000 barrels of water per day	9,250.00
1 - Gaso injection pump and 25 HP multiple cylinder engine packaged unit	2,400.00
1 - 500-barrel Redwood tank equipped with galvanized hoops	1,551.00
1 - 250-barrel Redwood tank equipped with galvanized hoops	940.00
2 - Concrete tank foundation blocks @ 150.00	300.00
1 - Water filter, 6' x 5', packed with anthrafilt or filtering sand	650.00
1 - Centrifugal backwash pump and electric motor, 300 gal per minute capacity	565.00
1 - Centrifugal pickup pump and electric motor, 150 gal per minute capacity	325.00
1 - Dry chemical feeder	300.00
1 - Wooden aereator, 15' x 10' x 15'	100.00
Earthen aereation pit, 150' x 150' x 10'	250.00
High pressure injection lines	1,650.00
Well-head equipment for six input wells including meters, valves and gages @ 160.00/well	960.00
Miscellaneous valves and connections	400.00
Labor	1,000.00
Engineering and contingencies	1,800.00
	$ 24,241.00

NEIL H. WILLS ET AL
RUSSELL POOL
EDDY COUNTY, NEW MEXICO

FACILITIES AND COST ESTIMATE FOR FLOOD EXPANSION

14 -	Additional input wells cleaned out and gravel packed @ 300.00 each	$ 4,200.00
2 -	Additional water source wells recompleted in the 900-foot limestone and equipped to pump 750-1000 barrels of water per day, @ 9,250.00 each	18,500.00
1 -	Aldrich direct flow 3" x 2½" triplex plunger pump, equipped with porcelain plungers, and Insuroch valves	3,900.00
1 -	50 HP 3-phase electric motor, reduced voltage starting box, and water level pilot circuit	1,850.00
1 -	500-barrel Redwood tank equipped with galvanized hoops	1,551.00
1 -	250-barrel Redwood tank equipped with galvanized hoops	940.00
2 -	Concrete tank foundation blocks @ 150.00	300.00
2 -	Water filters, 6' x 5' packed with anthrafilt or filtering sand @ 650.00	1,300.00
	Additional high pressure injection lines	4,450.00
	Water return lines,	4,000.00
	Well-head equipment for 14 additional input wells @ 160.00/well	2,240.00
	Additional valves and connections	1,000.00
1 -	Pressure-type oil treater for Wills South Battery	2,500.00
4 -	Atmospheric type oil treaters @ 2,000.00	8,000.00
	Additional Labor	1,500.00
	Engineering and contingencies	3,000.00
		$ 59,231.00
	Cost of Pilot Flood	24,241.00
	Cost of Complete Flood	$ 83,472.00

PETROLEUM ENGINEERS
CABLE ENGINEERING
WICHITA FALLS, TEXAS

NEIL H. WILLS ET AL
RUSSELL POOL
EDDY COUNTY, NEW MEXICO

PRODUCED WATER ANALYSIS FROM CROSBY LEASES

pH Value	8.6	Turbidity	20 ppm
Alkalinity P	100 ppm as $CaCO_3$	Alkalinity M	3580 ppm as $CaCO_3$
Hardness, Soap	7000 ppm as $CaCO_3$	Hardness, Soda	7000 ppm as $CaCO_3$
Soluble Iron	.5 ppm as Fe	Total Iron	.5 ppm as Fe
Soluble Silicia	10 ppm as SiO_2	Hydrogen Sulfide	3037 ppm as H_2S
Free Carbon Dioxide	0 ppm as CO_2	Dissolved Oxygen	0 ppm as O
Dissolved Solids	39110 ppm	Total Solids	39130 ppm

Calcium Carbonate Stability

Requirement	3220 ppm $CaCO_3$ at pH 9.9
Content	3580 ppm $CaCO_3$ at pH 8.6
Super Sat.	360 ppm

PRINCIPAL CONSTITUENTS

		ppm	(+) epm	(-) epm	Ionic ppm	
Calcium	as $CaCO_3$	4800	96.00		1920	ppm as Ca
Magnesium	as $CaCO_3$	2200	44.00		537	ppm as Mg
Hydroxide	as $CaCO_3$	0				
Carbonate	as $CaCO_3$	100*				
Bicarbonates	as $CaCO_3$	3580		71.60	4368	ppm as HCO_3
Sulfate	as SO_4	3283		68.40	3283	ppm as SO_4
Chloride	as Cl	17600		495.44	17600	ppm as Cl
Sodium & Potassium	as Na		495.44		11395	ppm as Na
			635.44	635.44		

Barium 0

*All Carbonates converted to Bicarbonates in hypothetical combinations.

HYPOTHETICAL COMBINATION

Calcium Bicarbonate	5799.6 ppm
Calcium Sulfate	1739.2 ppm
Magnesium Sulfate	2648.8 ppm
Sodium Chloride	28983.0 ppm

CORE ANALYSIS SERVICE
WICHITA FALLS, TEXAS

COMPANY: Neil H. Wills Et Al
WELL: Government Lease No. 26

(March 15, 1951)

GENERAL DATA:

CORED FROM	824 TO 844		
RECOVERED		20	FEET
ZONE ANALYZED	824 TO 844	18	FEET
OIL BEARING		20	~~XXX~~ Samples
OIL BEARING & HORIZONTALLY PERMEABLE		20	FEET
		20	FEET

ANALYSIS SUMMARY: (For Oil Bearing & Horizontally Permeable Zone)

AVEREAGE PERMEABILITY	6.8	VERTICAL-MILLIDARCYS
	30.5	HORIZONTAL-MILLIDARCYS
AVERAGE POROSITY	19.7	PER CENT
PRODUCTIVE FORMATION CAPACITY	610	MILLIDARCY-FEET
FORMATION VOLUME FACTOR (Actual or Estimated)	1.15	
RESERVOIR GAS-OIL RATIO (Calculated & Theoretical) (1)		CU. FT./BBL.

AVERAGE SATURATION:

RESIDUAL OIL	28.4	% OF PORE SPACE
CONNATE WATER	47.4	% OF PORE SPACE
TOTAL WATER	47.4	% OF PORE SPACE
OIL IN PLACE	705	BBLS./ACRE FOOT

AVERAGE RECOVERABLE OIL:

NORMAL RECOVERY (Gas Expansion) (2)	140	BBLS./ACRE FOOT
ADDITIONAL RECOVERY BY WATER DRIVE		BBLS./ACRE FOOT
GAS & WATER DRIVE RECOVERY (Complete) (3)		BBLS./ACRE FOOT
SPECIFIC PRODUCTIVITY INDEX		BBLS. OF FLUID/24 HRS./FT./ P. S. I. PRESSURE DIFFERENTIAL
FLUID PRODUCTION (No prediction shall be made unless the complete, properly secured and sealed core is submitted.)	011	

(1) Calculated for volumes of atmospheric pressure.
(2) Based on reduction of original reservoir pressure to zero p. s. i.
(3) Based on maintenance of original reservoir pressure by water drive.

NOTE: Type and amount of fluid calculated for complete isolation of zone analyzed.

CORE ANALYSIS SERVICE
WICHITA FALLS, TEXAS

COMPANY: Neil H. Wills Et Al
WELL: Government Lease No. 26
ZONE: 824 To 844

CORE ANALYSIS DATA AND INTERPRETATION

Sample Number	DEPTH Feet	PERMEABILITY Millidarcys Horizontal	PERMEABILITY Millidarcys Vertical	POROSITY Per Cent	Residual Saturation % Pore Space Oil	Residual Saturation % Pore Space Total Water	Chlorides 1000 P.P.M.	PROBABLE PROD. (1)	REMARKS
1	824-825	149.0	39.5	24.6	35.4	43.3	59.6	Oil	Fine gr silty sd, loosely consolidated
2	825-826	41.2		22.7	26.7	56.5	89.5	Oil	Fine gr silty sd w/thin blue shale streaks
3	826-827	37.7	15.6	23.2	20.8	51.3	89.5	Oil	Sand, harder
4	827-828	32.6		23.7	21.6	49.6	89.5	Oil	Fine grained silty sand
5	828-829	28.2	1.4	23.8	20.5	45.3	54.7	Oil	" " " "
6	829-830	56.8		21.4	31.7	42.8	54.7	Oil	" " " "
7	830-831	3.9	1.1	20.8	32.3	48.2	54.7	Oil	" " " "
8	831-832	5.8		23.5	14.7	48.0	54.7	Oil	" " " "
9	832-833	6.4	0.8	21.6	20.0	50.0	49.7	Oil	" " " "
10	833-834	103.0		18.4	26.4	49.8	49.7	Oil	" " " "
11	834-835	7.8		16.4	33.7	47.5	39.8	Oil	Fine gr silty sd w/occasional blue sh strks
12	835-836	21.4	0	17.8	31.2	44.3	39.8	Oil	" " " "
13	836-837	35.8		16.5	44.3	38.2	39.8	Oil	" " " "
14	837-838	10.2	0	15.2	34.5	43.4	34.8	Oil	Sd w/sh strks
15	838-839	3.9		16.3	26.3	42.8	39.8	Oil	" " " "
16	839-840	54.0		16.5	30.1	41.0	39.8	Oil	" " " "
17	840-841	3.4		18.8	36.6	43.8	34.8	Oil	Sand, better consolidated
18	841-842	7.0	2.5	17.0	33.7	53.5	39.8	Oil	" " " "
19	842-843	1.0		18.3	25.7	50.4	39.8	Oil	" " " "
20	843-844	0.8	0	17.6	29.6	52.3	41.5	Oil	" " " "

NOTE: (1) Prediction Based on Complete Isolation of Zone.

POLICY: Core Analysis Service assumes no responsibility as to any predictions or data other than representing the best judgment of this organization. All observations and data secured shall remain the exclusive and confidential property of the client.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

April 12, 1982

Barber Oil, Inc.
111 West Mermod
P.O. Box 1658
Carlsbad, NM 88220

Case No
469

ATTENTION: Michael D. Garringer

RE: Exception to Rule 705-A
for Injection Wells

Dear Sir:

Pursuant to Barber Oil, Inc.'s request for exception of thirty-seven (37) injection wells, as listed on TABLE I, from Rule 705-A, the Oil Conservation Division (OCD) hereby denies your request.

Review of your application and history thereof by the Santa Fe and Aztec District offices concludes that you have not demonstrated good cause to be entitled to exception to Rule 705-A.

The OCD requests that Barber Oil, Inc., take appropriate actions as outlined in the OCD Memorandum of September 30, 1981. (See Attachment)

If you have any questions regarding this matter, please do not hesitate to call or contact Oscar Simpson, at (505) 827-2534.

Sincerely,

Joe D. Ramey
Division Director

JDR/OS/dp

Enc.

TABLE I

1.	Crosby Federal Wells	#1, Section 12, Township 20 South, Range 28 East
2.		#2 " " "
3.		#4 " " "
4.	Turner Federal Wells	#2, Section 13, Township 20 South, Range 28 East
5.		#3 " " "
6.		#6 " " "
7.		#12 " " "
8.		#13 " " "
9.		#15 " " "
10.		#18 " " "
11.		#21 " " "
12.		#22 " " "
13.	Wills Federal Wells	#2, Section 13, Township 20 South, Range 28 East
14.		#5 " " "
15.		#6 " " "
16.		#8 " " "
17.		#10 " " "
18.		#14 " " "
19.		#15 " " "
20.		#17 " " "
21.		#18 " " "
22.		#19 " " "
23.		#21 " " "
24.		#23 " " "
25.		#25 " " "
26.		#26 " " "
27.		#27 " " "
28.		#30 " " "
29.		#33 " " "
30.		#34 " " "
31.		#35 " " "
32.		#36 " " "
33.		#37 " " "
34.		#39 " " "
35.		#41 " " "
36.		#42 " " "
37.		#45 " " "

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

M E M O R A N D U M

TO: ALL NEW MEXICO INJECTION WELL OPERATORS

FROM: JOE D. RAMEY, DIRECTOR

SUBJECT: TEMPORARY ABANDONMENT OF INJECTION WELLS

Division Rule 705A provides in part that "no injection well may be temporarily abandoned for more than six months unless the injection interval has been isolated by use of cement or a bridge plug." The Division Director may delay the cement or bridge plug requirement upon a request by the operator and a showing that such well is mechanically sound, that there is a continuing need for the well, and that the well constitutes no threat to underground sources of drinking water.

Division survey programs have found several hundred injection wells which have not been used for at least six months and which do not have the requisite plugs. Based upon these surveys the Division will be moving to enforce Rule 705A in the near future.

Operators should review the status of their injection wells and within the next six months take one of the following actions relative to injection wells which have been shut in for six months or longer:

(1) Return the well to active operation.

(2) Plug and abandon the well or place a cement or bridge plug above the injection interval.

(3) File a workover or plugging plan and schedule with the appropriate Division district office.

(4) File a request for exception to Rule 705A with the Division Director in Santa Fe.

September 30, 1981
fd/

BARBER OIL, INC.
111 West Mermod
Post Office Box 1658
CARLSBAD, NEW MEXICO 88220
(505) 887-2566

April 1, 1982

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87501

Attn: Oscar Simpson III
Water Resource Specialist

Re: Exception to Rule 705-A
LC-050797, Crosby-Turner-Wills Comm. Btry
Russell Field Waterflood, Eddy Co., NM

Dear Sir:

As per your letter of March 24, 1982 I hereby submit "Injection Well Data Sheets" on all wells listed in our letter of March 4, 1982 with one exception. Wills #29 is currently "Plugged & Abandoned".

The "Injection Well Data Sheets" should complete your information for sub-paragraphs (a) thru (j). Sub-paragraph (m) is not applicable and (k) & (l) are as follows:

(k) All of the injection wells were temporarily discontinued during the months of May and June, 1980.

(l) Injection will resume as soon as a tertiary recovery program is economically feasible.

Again, I must point out that no drinking water sources are located in this area and we consider the wells essential to our future tertiary recovery program.

Very truly yours,

BARBER OIL, INC.

Michael D. Garringer
Manager

Encl: 37

BARBER OIL, INC.
111 West Mermod
Post Office Box 1658
CARLSBAD, NEW MEXICO 88220
(505) 887-2566

March 4, 1982

New Mexico Oil Conservation Division
Energy & Minerals Department
P. O. Box 2088
Santa Fe, NM 87501

Attn: Joe D. Ramey

Re: Federal Oil & Gas Lease
LC-050797 - Russell Pool
Eddy County, New Mexico
Sec. 12, T20S, R28E N.M.P.M.

Gentlemen:

Under your Memo of September 30, 1981 as provided under Division Rule 705A whereby no injection well may be temporarily abandoned for more than six months; this company hereby requests an exception to Rule 705A on the following wells:

Under Crosby Federal - Well Nos. 1,2, &4
Under Turner Federal - Well Nos. 2,3,6,12,13,15,18,21, & 22
Under Wills Federal - Well Nos. 2,5,6,8,10,14,15,17,18,19,21,23,25,26,27,29, 30,33,34,35,36,37,39,41,42, & 45

The above wells are considered to be viable injection wells, not taking water at this time, yet valuble to a tertiary recovery program in the not to distant future. We feel these wells in no way damage the underground sources of drinking water as there is no drinking water in this interval in this area.

I enclose a copy of a letter from our consulting engineering firm, Stephens Engineering, under the signature of Joe L. Johnson, Jr. where he supports this request.

As captioned above this is a Federal oil & gas lease and comes under your jurisdiction through a ruling in the Federal Register/Vol. 47, No. 25/Friday, February 5, 1982/40CFR Part 123 and made effective that same date.

We would appreciate the OCD's concurrence with our request to retain these wells for a future recovery program.

Very truly yours,

RECEIVED MAR 9 1982 OIL CONSERVATION DIVISION SANTA FE

Robert S. Light

Encl: 1

CC: George H. Hunker, Jr.
Michael Stubblefield, OCD-Artesia
Joe L. Johnson, Jr.

WATER FLOODING VALUATIONS RESERVOIR STUDIES

TELEPHONE - 817-723-2166

PETROLEUM ENGINEERS
STEPHENS ENGINEERING
WICHITA FALLS, TEXAS

POST OFFICE BOX-2249

WICHITA FALLS, TEXAS
76307

December 30, 1981

Barber Oil, Inc.
P. O. Box 1658
Carlsbad, New Mexico 88220

Attn: Mr. Bob Light

Re: Injection Well Status
Barber Oil, Inc.
Russell Pool Project
Eddy County, New Mexico

Dear Mr. Light:

Reference is made to our conversation concerning the necessity to plug and abandon several of the inactive injection wells in the Barber Oil, Inc., Russell Pool Water Flood, Eddy County, New Mexico.

It is our understanding that the State of New Mexico requires that an injection well be plugged after a six month shut-in period. There are also other means in which the well can be maintained, these include returning the well to active operation, filing a workover or plugging plan, and/or filing a request for an exception to Rule 705A with the Division Director in Santa Fe.

We are of the opinion that this project is a prime prospect for tertiary development in the not too distant future. Its shallow depth and remaining oil in place are extremely important in the use of this anticipated process. In view of this, it is extremely important that all wells be maintained and not plugged and abandoned since this would require a rather large expenditure in redrilling should such a process be undertaken in the future. For these reasons, we are of the opinion that a request for an exception to Rule 705A be filed with the Division Director in Santa Fe at the earliest possible date. We remain of the opinion that this project would be an excellent prospect for tertiary development but feel that the loss of any well in the project

area would make the installation of a tertiary project more difficult and therefore possibly force a long delay period for the installation of such a project.

Should there be any questions, please do not hesitate to contact us.

Yours very truly,

STEPHENS ENGINEERING

Joe L. Johnson, Jr.

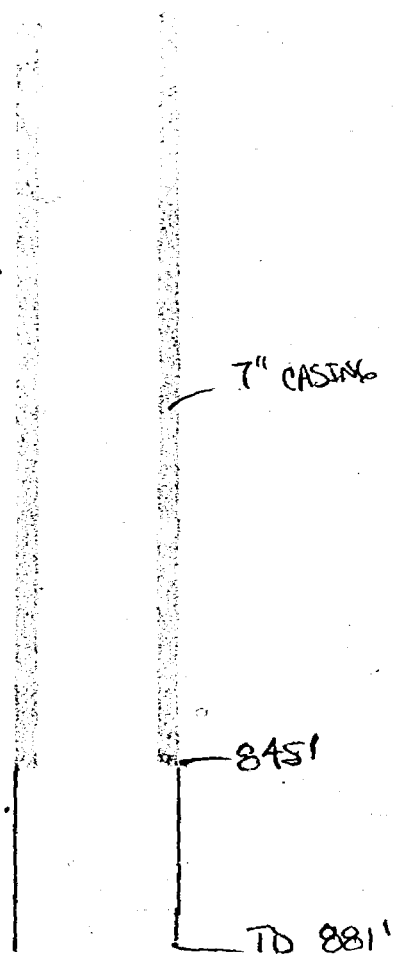
JLJjr/dk

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATION) LC-050791 (LEASE) CROSBY FEDERAL

1 (WELL NO.) 330' FSL & 2310 FEL. (FOOTAGE LOCATION) 12 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 75 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 845

Injection interval

844 feet to 881 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

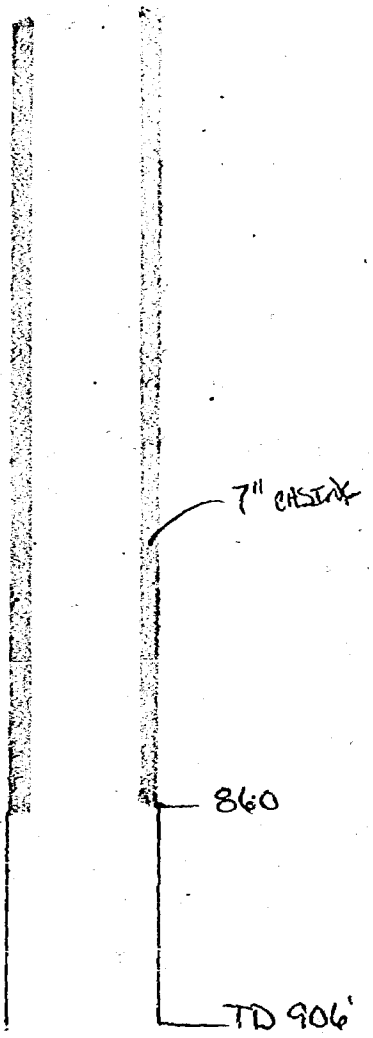
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATION) — CC-050797 (LEASE) — CROSBY FEDERAL

2 (WELL NO.) — 330' FSL and 1650' FEL (FOOTAGE LOCATION) — 12 (SECTION) — 20 SOUTH (TOWNSHIP) — 38 EAST (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 75 sx.

TOC UNKNOWN feet determined by _____

Hole size 8 1/2

Total depth 860

Injection interval

863 feet to 906 feet

~~(perforated~~ or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

L (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

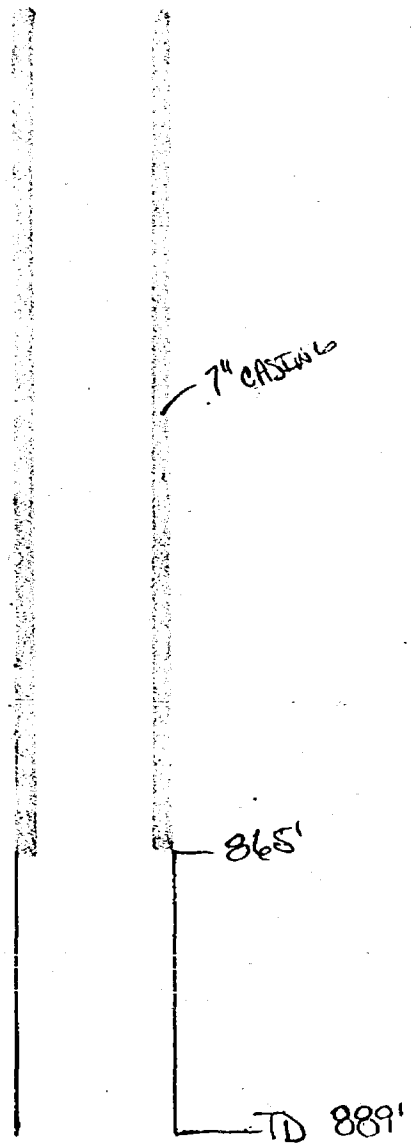
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area.

INJECTION WELL DATA SHEET

BARBER OIL INC. (OPERATOR) LC-065797 (LEASE) CROSBY FEDERAL

4 (WELL NO.) 1663' FSL AND 2003' FEL (FOOTAGE LOCATION) 12 (SECTION) 20 SOUTH (TOWNSHIP) 28 EAST (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 125 sx.

TOC UNKNOWN feet determined by _____

Hole size 8½"

Total depth 865

Injection interval

867 feet to 889 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

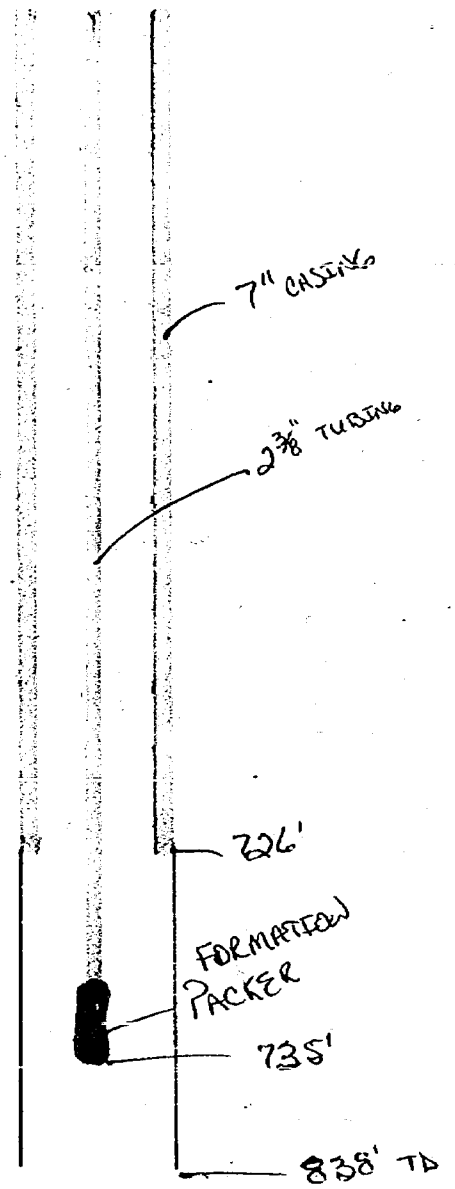
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

OPERATOR	LEASE	
BARBER OIL, INC.	LC-050797	TUCKER FEDERAL

WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
2	1980' FSL AND 1980' FWL	13	20S	28E

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with _____ sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 726'

Injection interval

812 feet to 827 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size 2 3/8" lined with CEMENT (material) set in a

GUIBERSON 2"X7" (brand and model) packer at 735 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO

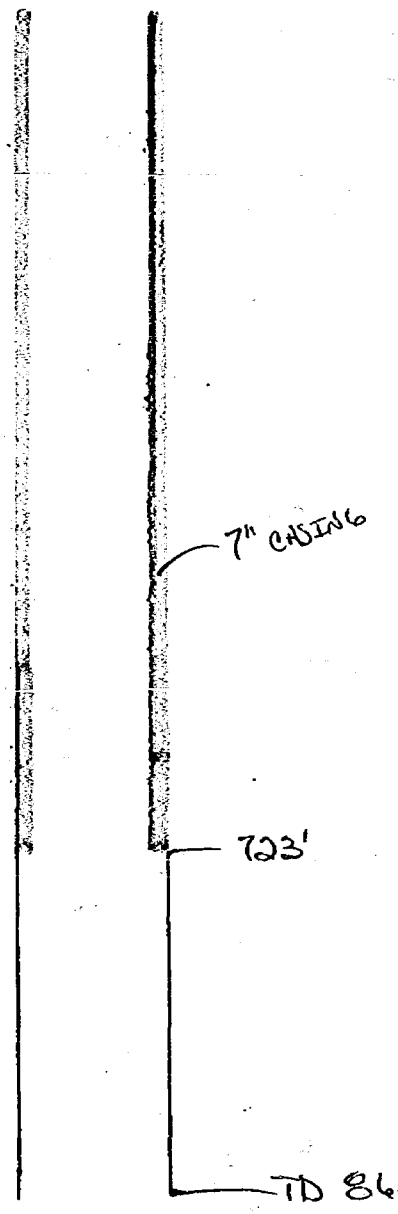
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATOR) | LC-050797 (LEASE) | TURNER FEDERAL

3 (WELL NO.) | 1980' FSL AND 1970' FEL (FOOTAGE LOCATION) | 13 (SECTION) | 20S (TOWNSHIP) | 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 50 sx.

TOC UNKNOWN feet determined by _____

Hole size _____

Total depth ~~725'~~ 723'

Injection interval

841 feet to 862 feet

(perforated or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

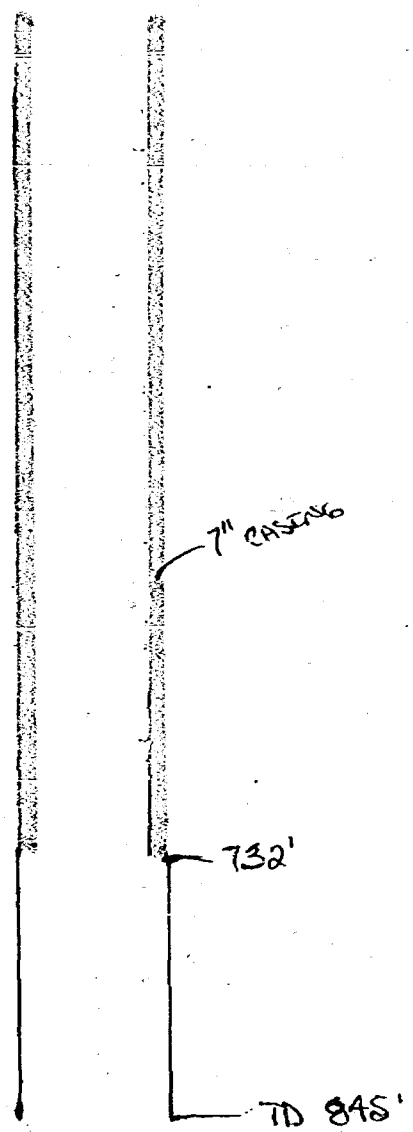
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL INC. (OPERATOR) LC-050797 (LEASE) TURNER FEDERAL

6 (WELL NO.) 660' FNL AND ~~1980'~~ 1980' FWL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 100 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 732'

Injection interval

826 feet to 845 feet

~~(perforated~~ or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seel).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

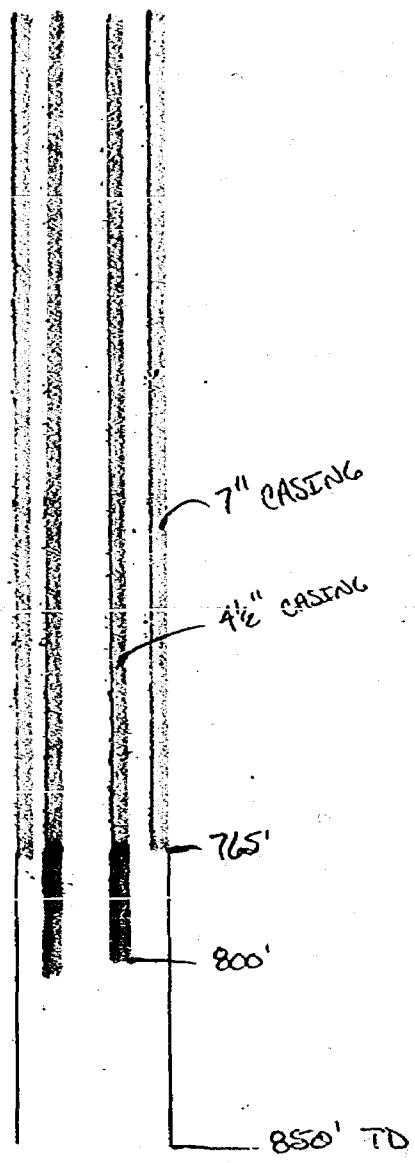
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL INC. (OPERATOR) LC-050797 (LEASE) TURNER FEDERAL

12 (WELL NO.) 2322' FSL AND 2339 FWL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 4½" + 7 " Cemented with 100 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 765'

Injection interval

826 feet to 860 feet

(perforated or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO

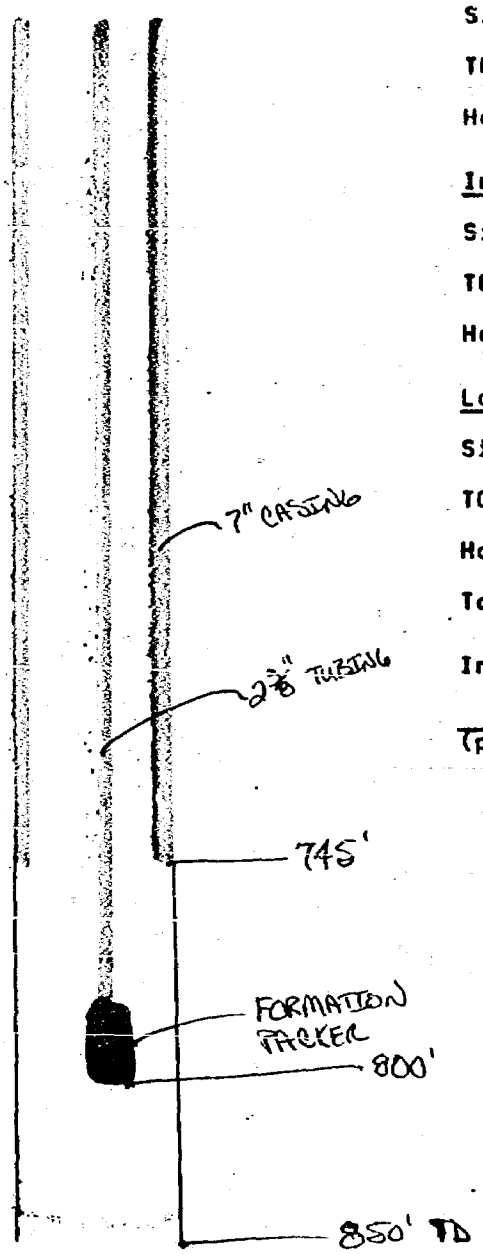
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL INC. (OPERATOR) CC-050797 (LEASE) TURNER FEDERAL

13 (WELL NO.) 332' FNL AND 2340 FWL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7 " Cemented with 100 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 745'

Injection interval

808 feet to 845 feet

(perforated or open-hole, indicate which)

Tubing size 2 3/8" lined with CEMENT (material) set in a LYNES 2"X 4 1/4" (brand and model) packer at 800 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ___ Yes XX No

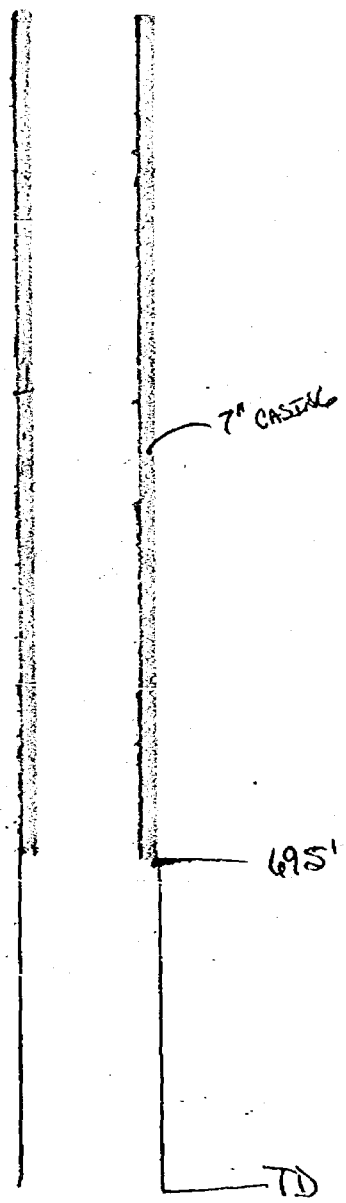
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARGER OIL INC. (OPERATION) CC-050797 (LEASE) TURNER FEDERAL

15 (WELL NO.) 331 FSL AND 1669 FWL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 75 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 695'

Injection interval

789 feet to 808 feet

([illegible]d or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

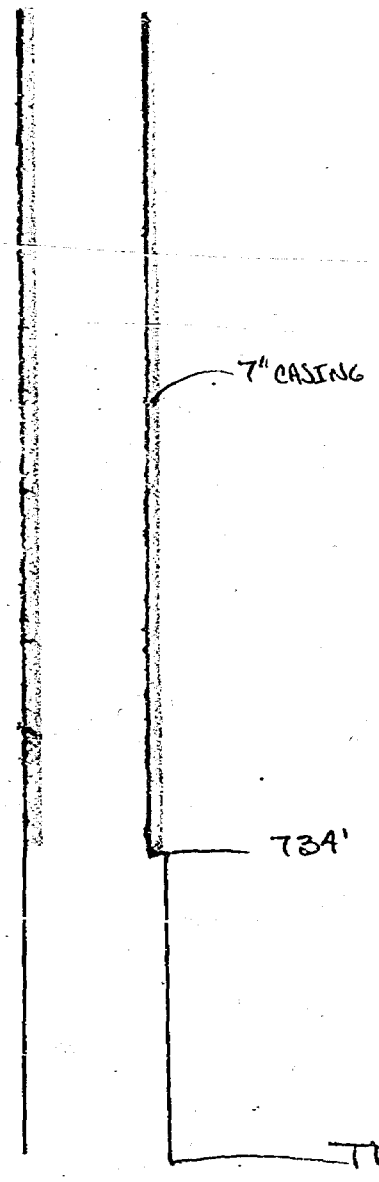
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

Barber Oil, Inc. (OPERATOR) LC-050797 (LEASE) Turner Federal

18 (WELL NO.) 1658' FNL and 2339' FWL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 75 sx.

TOC Unknown feet determined by _____

Hole size 8"

Total depth 734'

Injection interval

799 feet to 829 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation Yates
2. Name of Field or Pool (if applicable) Russell
3. Is this a new well drilled for injection? ☐ Yes ☒ No

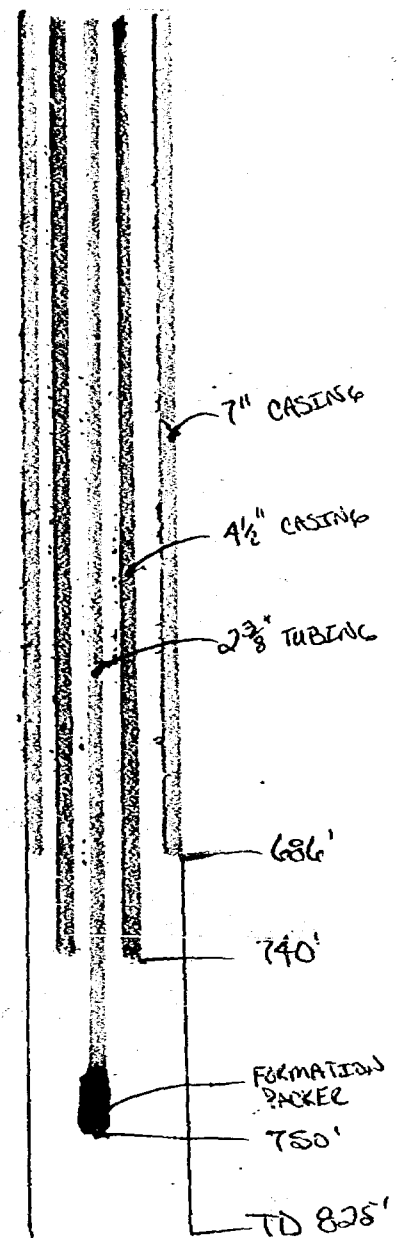
   If no, for what purpose was the well originally drilled? Producer
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. None

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATOR) | (C-0580977) (LEASE) | TURNER FEDERAL

21 (WELL NO.) | 959' FSL & 2339 FEL (FOOTAGE LOCATION) | 13 (SECTION) | 20S (TOWNSHIP) | 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 4½ + 7" Cemented with 125 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 686'

Injection interval

789 feet to 819 feet

(perforated or open-hole, indicate which)

Tubing size 2⅜" lined with PLASTIC (material) set in a

ARROW TYPE SL 2" X 4" (brand and model) packer at 750 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

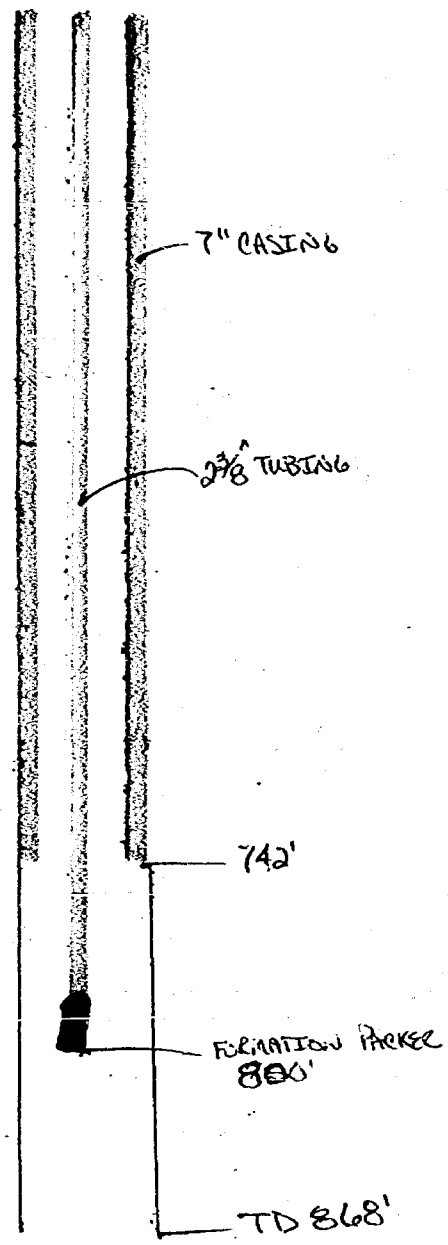
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL INC. (OPERATOR) LC-050797 (LEASE) TURNER FEDERAL

22 (WELL NO.) 2322 FSL AND 1669 FEL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7 " Cemented with 125 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth ~~868~~ 742'

Injection interval

846' feet to 868 feet

(perforated or open-hole, indicate which)

Tubing size 2 3/8" lined with CEMENT (material) set in a

(LOCKSET) 2X 7" (brand and model) packer at 800 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

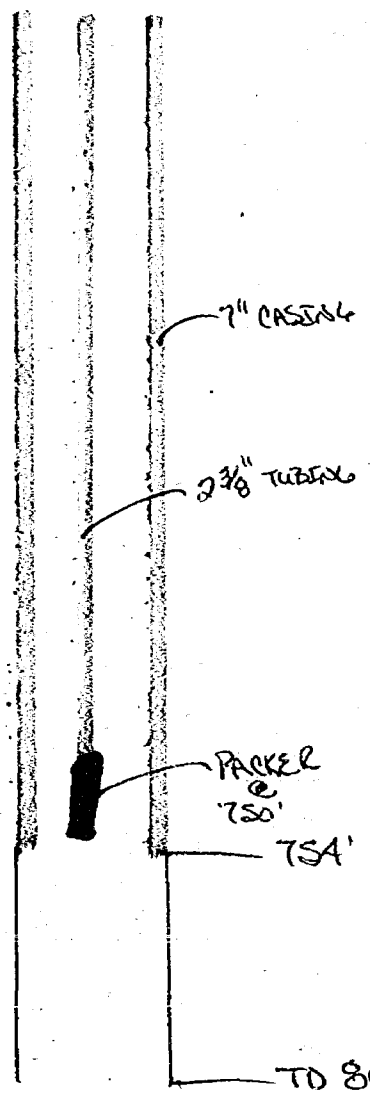
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL INC. (OPERATOR) LC-050797 (LEASE) WELLS FEDERAL

2 (WELL NO.) 660' FSL 660' FWL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 50 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 754

Injection interval

785 feet to 809 feet

~~(perforated~~ or open-hole, indicate which)

Tubing size 2 3/8 lined with _____ (material) set in a

LYNES 2 x 4 1/4 (brand and model) packer at 750 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

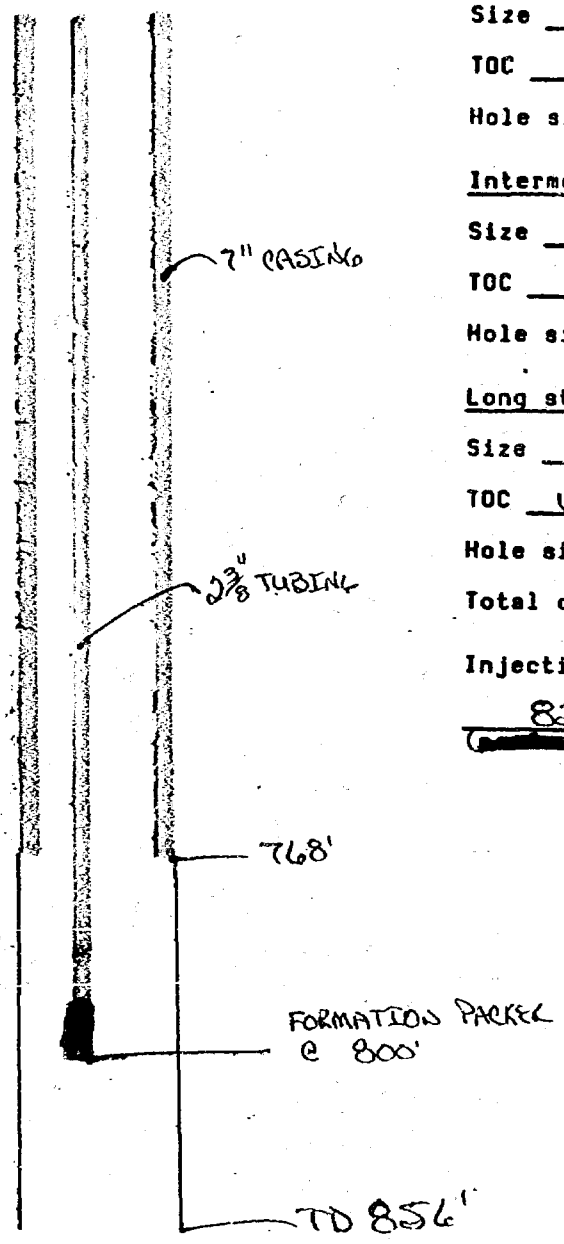
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER Oil, Inc. (OPERATOR) LC 050797 (LEASE) Wells Federal

5 (WELL NO.) 990' FNL AND 330' FWL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 125 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 768

Injection interval

828 feet to 856 feet

(perforated or open-hole, indicate which)

Tubing size 2 3/8" lined with CEMENT (material) set in a

LYNES 2" X 4'4" (brand and model) packer at 800 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No

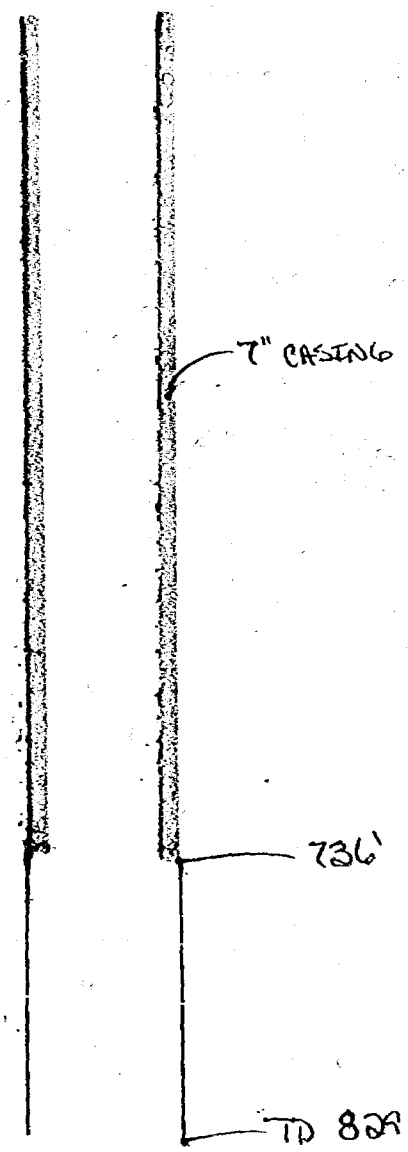
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATOR) | LC-050797 (LEASE) | WELLS FEDERAL

6 (WELL NO.) | 996' FSL AND 1005 FWL (FOOTAGE LOCATION) | 13 (SECTION) | 20S (TOWNSHIP) | 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 75 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 736'

Injection interval

803 feet to 829 feet

([illegible] or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

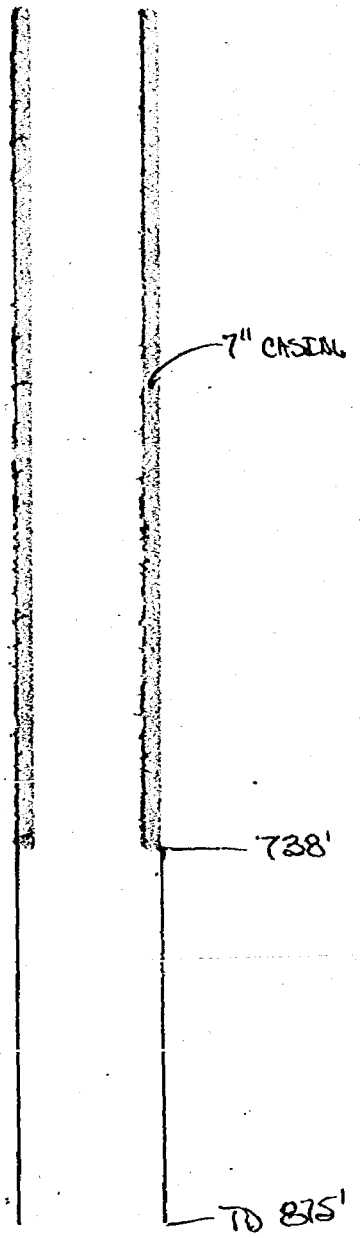
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL INC — OPERATOR
LC-050797 — LEASE
WELLS FEDERAL

8 — WELL NO.
996' FNL 1005 FEL — FOOTAGE LOCATION
13 — SECTION
20S — TOWNSHIP
28E — RANGE

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 100 sx.

TOC UNKNOWN feet determined by _____

Hole size 8"

Total depth 738'

Injection interval

857 feet to 872 feet

([redacted] or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☑ No

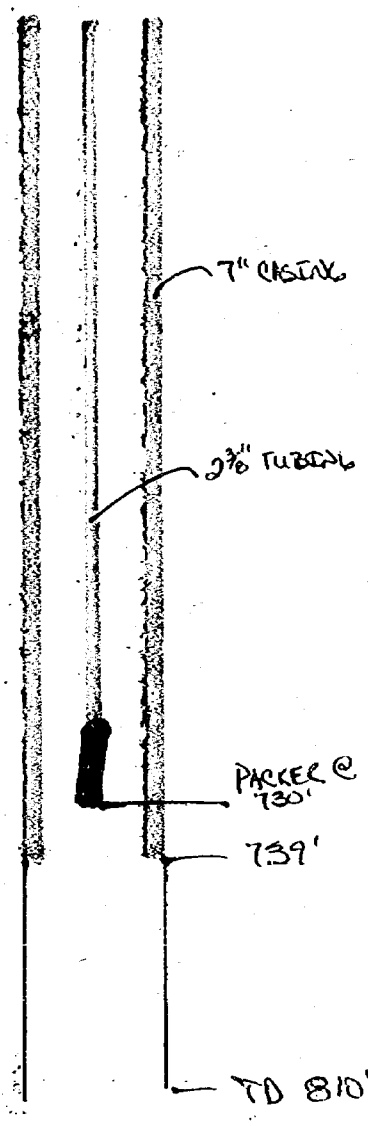
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATOR) | LC-050797 (LEASE) | WELLS FED.

10X (WELL NO.) | 2322' FSL AND 1005 FWL (FOOTAGE LOCATION) | 13 (SECTION) | 20S (TOWNSHIP) | 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 100 sx.

TOC (UNKNOWN) feet determined by _____

Hole size 8"

Total depth 739'

Injection interval

775 feet to 800 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size 2 3/8" lined with _____ (material) set in a

(BROWN) 2"X 7" (brand and model) packer at 730 feet.

(or describe any other casing-tubing seal).

Other Data

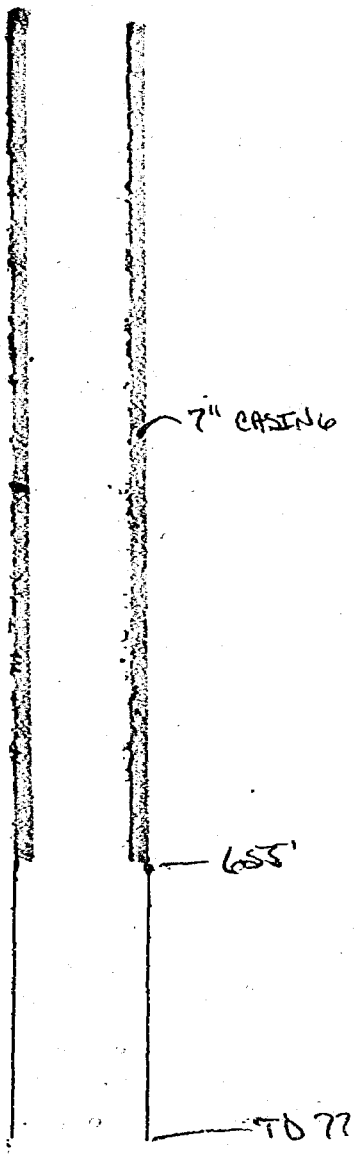
1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

BARBE OIL INC. (LC-050197) WELLS FED
OPERATOR LEASE

14 330 FSL - 330 FEL 13 20S 28E
WELL NO. FOOTAGE LOCATION SECTION TOWNSHIP RANGE

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 125 sx.

TOC UNKNOWN feet determined by _____

Hole size ~~6¼"~~ 8"

Total depth 655

Injection interval

756 feet to 770 feet
(perforated or open-hole, indicate which)

Tubing size _____ lined with _____ set in a
(material)

_____ packer at _____ feet.
(brand and model)

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO

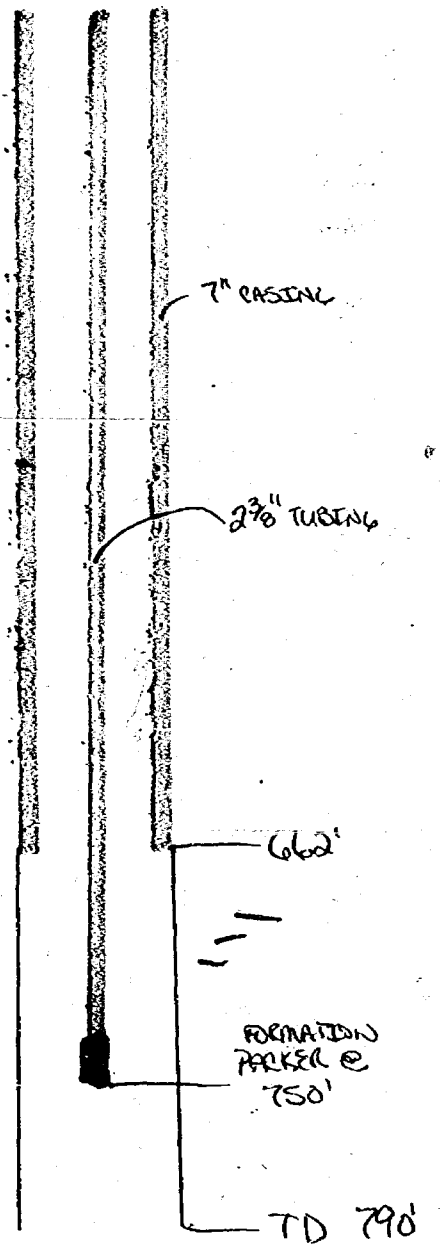
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL INC. (OPERATOR) CC-050777 (LEASE) WILLS FED.

15 (WELL NO.) 996' FSL AND 330' FEL (FOOTAGE LOCATION) ~~14~~ (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 125 sx.

TOC UNKNOWN feet determined by _____

Hole size 8½" TO 754 8" TO 754 TO 784

Total depth 662

Injection interval

764 feet to 784 feet

([redacted] or open-hole, indicate which)

Tubing size 2⅜ lined with CEMENT (material) set in a

(GUIBERSON) 2"X7" (brand and model) packer at 750 feet.

(or describe any other casing-tubing seal).

Other Data

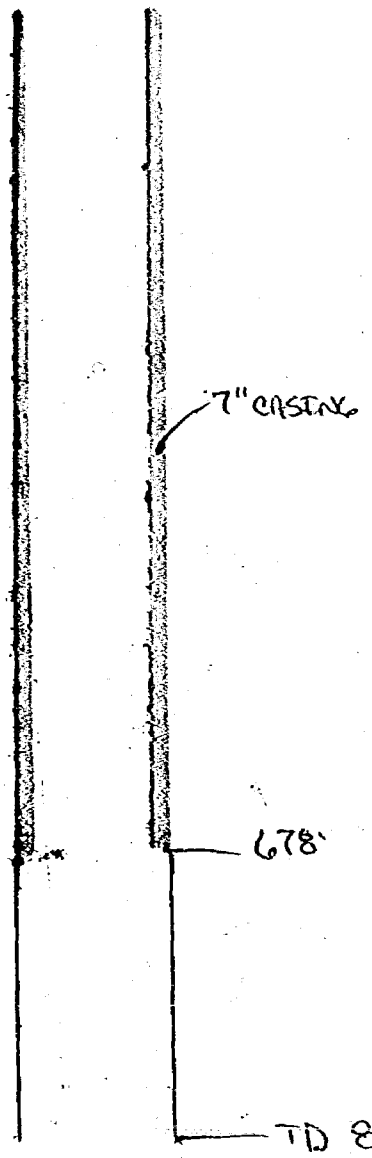
1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

Barrel Del, Inc. — OPERATOR
LC-050797 Wells Fed — LEASE

17 — WELL NO.
FOOTAGE LOCATION
13 — SECTION
20 S — TOWNSHIP
28 E — RANGE

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 125 sx.

TOC unknown feet determined by _____

Hole size 8½"

Total depth 678'

Injection interval

780 feet to 800 feet

([redacted]d or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) Russell
3. Is this a new well drilled for injection? [ ] Yes [X] No

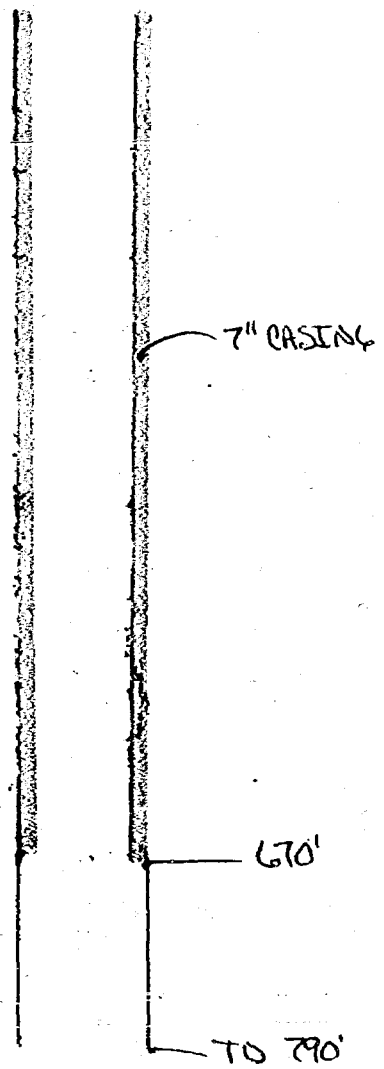
   If no, for what purpose was the well originally drilled? Production
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. None

INJECTION WELL DATA SHEET

BARBER Oil, Inc. (LC-050797) Wells Fed.
OPERATOR LEASE

18 | 338' FSL & 350' FWL | 13 | 20S | 28E
WELL NO. | FOOTAGE LOCATION | SECTION | TOWNSHIP | RANGE

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 150 sx.

TOC UNKNOWN feet determined by _____

Hole size 8½"

Total depth 670'

Injection interval

767 feet to 782 feet
(perforated or open-hole, indicate which)

Tubing size _____ lined with _____ set in a
(material)

_____ packer at _____ feet.
(brand and model)

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO

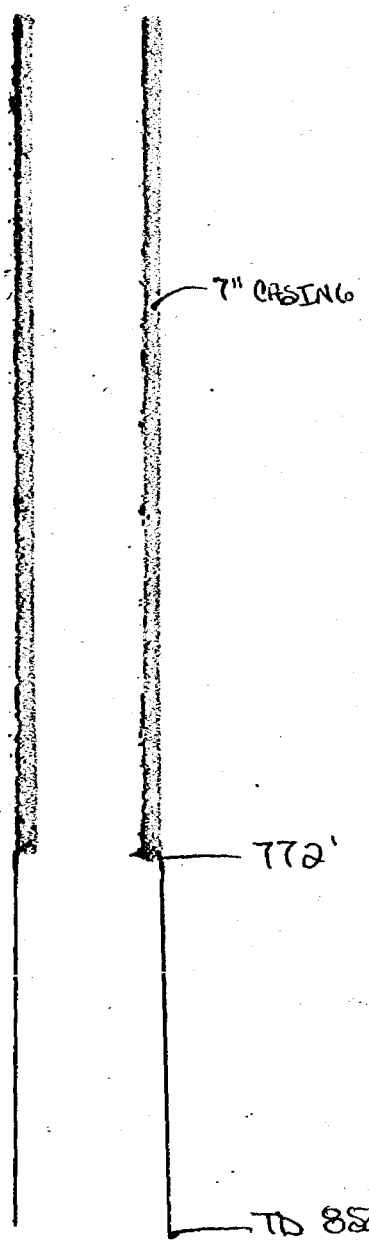
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

Barber Oil, Inc. (OPERATOR) LC-050797 (LEASE) Wells Fed.

19 (WELL NO.) 2322' FNL 2333' FEL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 150 sx.

TOC Unknown feet determined by _____

Hole size 8½"

Total depth 772'

Injection interval

829 feet to 849 feet

(perforated or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation Yates
2. Name of Field or Pool (if applicable) Russell
3. Is this a new well drilled for injection? ☐ Yes ☒ No

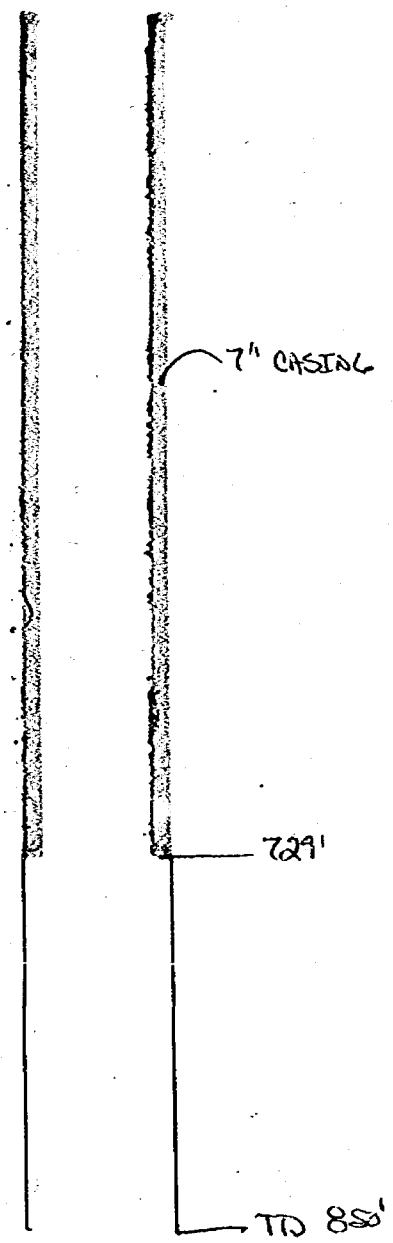
   If no, for what purpose was the well originally drilled? Production
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. None

INJECTION WELL DATA SHEET

BARBER OIL INC (OPERATOR) | LC-050971 (LEASE) | WELLS FED.

21 (WELL NO.) | 1656' FNL & 1665 FEL (FOOTAGE LOCATION) | 13 (SECTION) | 20S (TOWNSHIP) | 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 150 sx.

TOC UNKNOWN feet determined by _____

Hole size 8¼"

Total depth 729'

Injection interval

832 feet to 848 feet

(perforated or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO

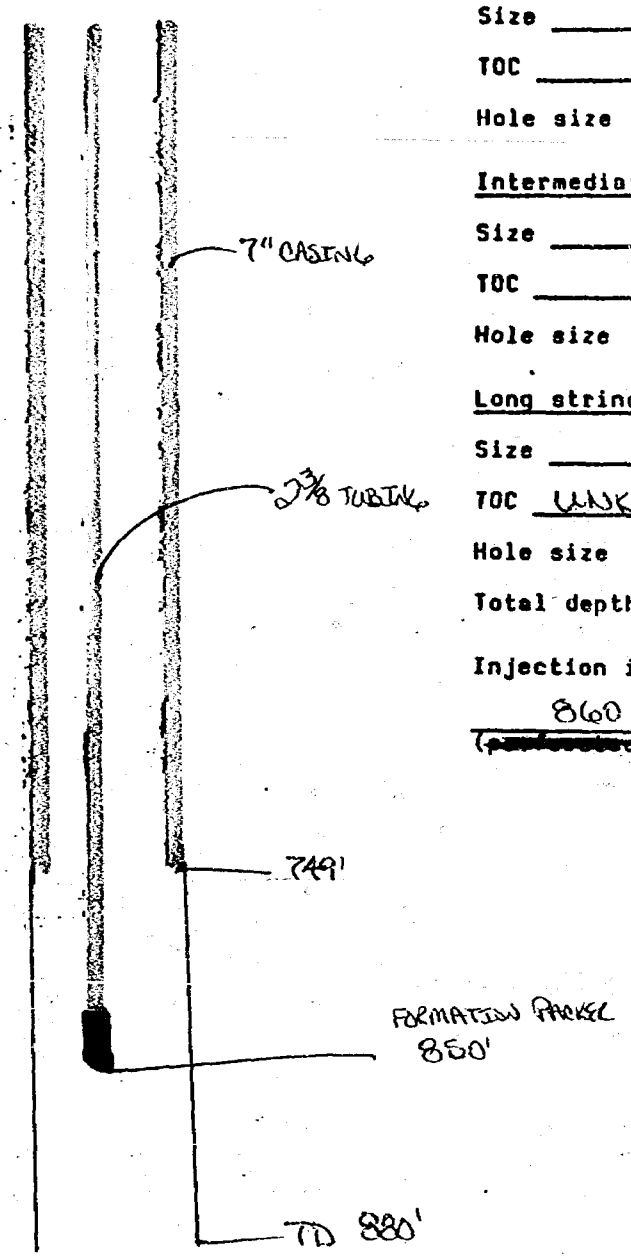
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL INC. (OPERATOR) CC-080797 (LEASE) WELLS FED.

23 (WELL NO.) 330' FNL AND 1665' FEL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 180 sx.

TOC UNKNOWN feet determined by _____

Hole size 8 1/2

Total depth 749

Injection interval

860 feet to 875 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size 2 3/8" lined with CEMENT (material) set in a

LYNES 2"X 4 1/4" (brand and model) packer at 850 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO

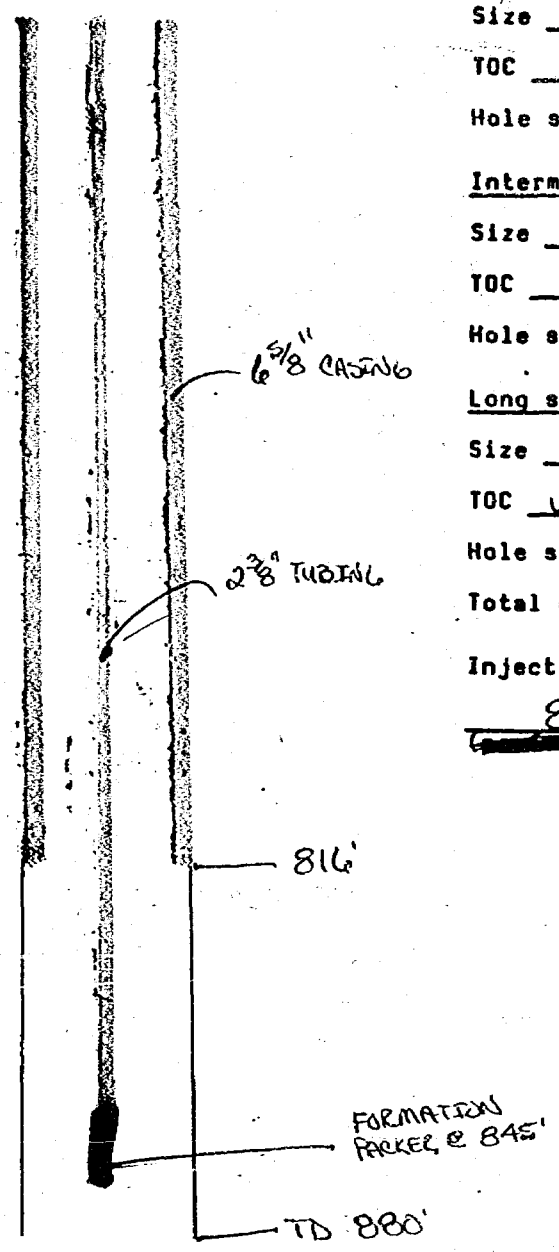
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATOR) — LC-050797 (LEASE) — WELLS FED.

25 (WELL NO.) — 660' FNL and 2000' FEL (FOOTAGE LOCATION) — 13 (SECTION) — 20S (TOWNSHIP) — 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 6 5/8" Cemented with 100 sx.

TOC UNKNOWN feet determined by _____

Hole size 8 1/2"

Total depth ~~880'~~ 816'

Injection interval

850 feet to 873 feet

([redacted] or open-hole, indicate which)

Tubing size 2 3/8 lined with _____ (material) set in a

LYNES 2" X 4 1/4" (brand and model) packer at 845 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

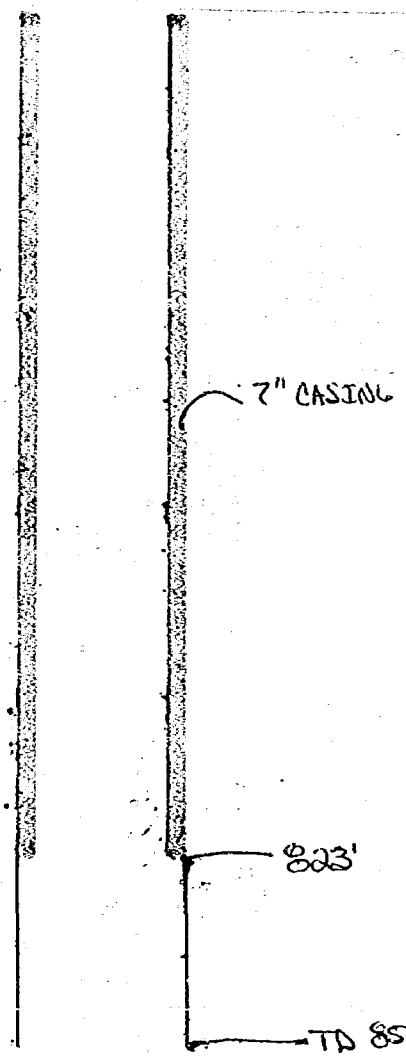
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

Babbel Oil, Inc. (OPERATOR) LC-050797 (LEASE) Wells (LEASE)

26 (WELL NO.) 1305' FNL & 1980' FEL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 7" Cemented with 100 sx.

TOC unknown feet determined by _____

Hole size 8¼"

Total depth 823'

Injection interval

826 feet to 846 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

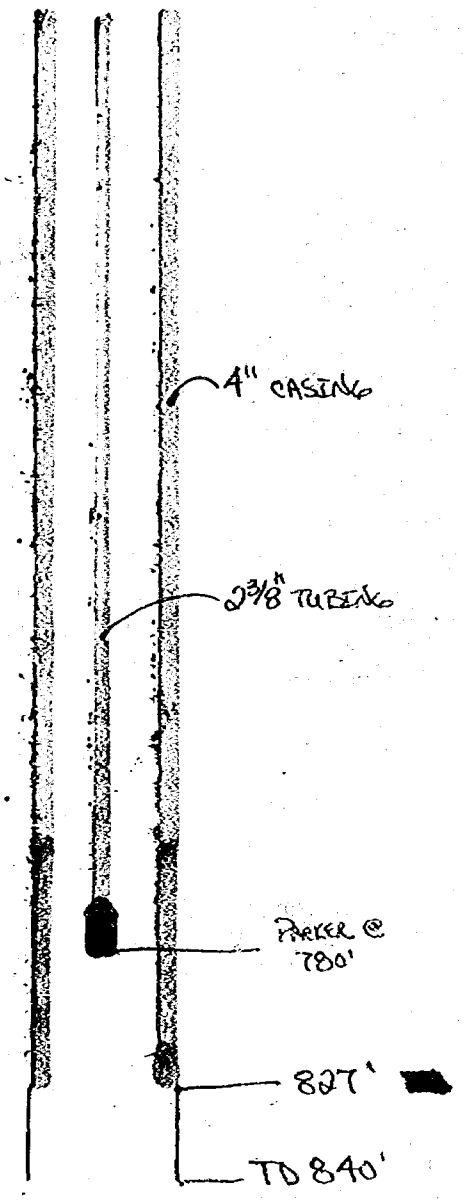
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BABER OIL INC. (OPERATION) LC-050797 (LEASE) WELLS FED.

27 (WELL NO.) 1325' FSL & 660' FWL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 4" Cemented with 450 sx.

TOC UNKNOWN feet determined by _____

Hole size 5½"

Total depth 827'

Injection interval

791 feet to 819 feet

(perforated or [redacted], indicate which)

Tubing size 2 3/8 lined with CEMENT (material) set in a

GUIBERSON 2"X4" (brand and model) packer at 780 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? [ ] Yes [X] No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No

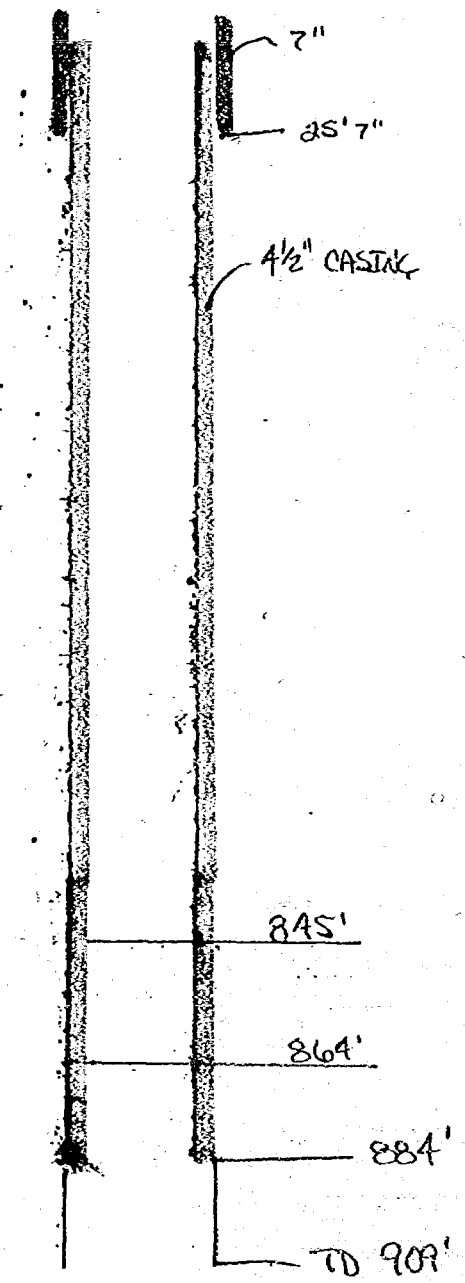
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

Barrel Oil, Inc. (OPERATOR) LC-050797 (LEASE) Wells Fed.

30 (WELL NO.) 2310' FNL + 990' FEL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing 1 JT.

Size 7" Cemented with 10 (as conductor) sx.

TOC _____ feet determined by _____

Hole size 8½"

Long string

Size 4½" Cemented with 287 sx.

TOC 225' feet determined by TS

Hole size 6¼"

Total depth 884

Injection interval

845 feet to 864 feet

(perforated or ~~open hole~~, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

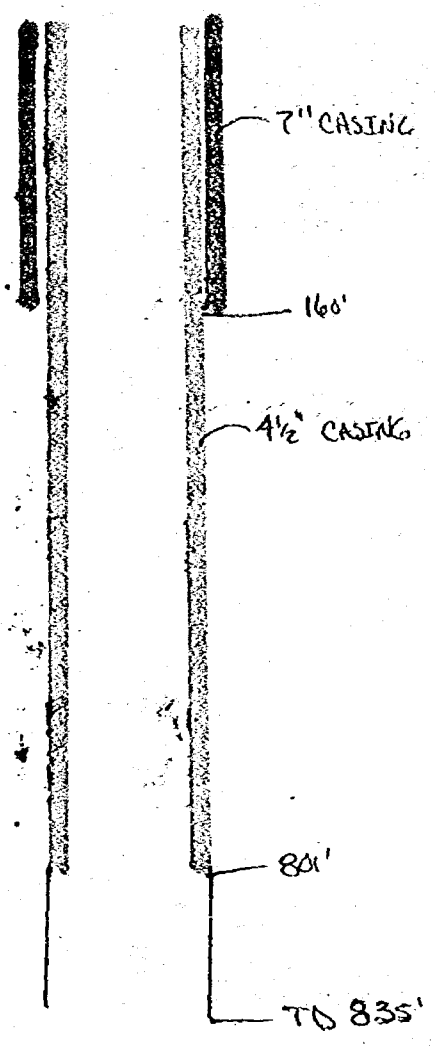
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBEE OIL, INC. (OPERATOR) — LC-050797 (LEASE) — WELLS FED.

33 (WELL NO.) — 1330' FSL & 1980' FWL (FOOTAGE LOCATION) — 13 (SECTION) — 20S (TOWNSHIP) — 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size 7" Cemented with 15 sx.

TOC _____ feet determined by _____

Hole size 8½"

Long string

Size 4½" Cemented with 160 sx.

TOC UNKNOWN feet determined by _____

Hole size 6¼"

Total depth 801

Injection interval

800 feet to 800 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

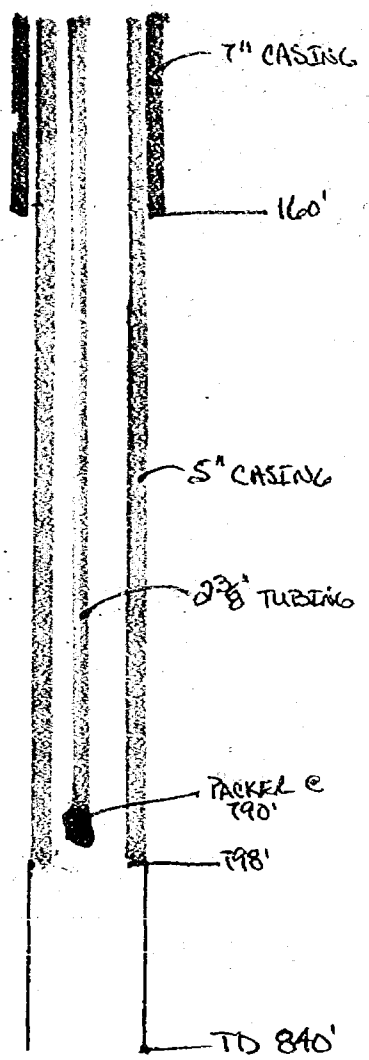
   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL, INC (OPERATOR) | LC-050797 (LEASE) | WELLS FED.

34	2630' FNL + 1980 FWL	13	20S	28E
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size 7" Cemented with 15 sx.

TOC _____ feet determined by _____

Hole size 8½"

Long string

Size 5" Cemented with 60 sx.

TOC UNKNOWN feet determined by _____

Hole size 6¼"

Total depth 798'

Injection interval

799 feet to 828 feet
(perforated or open-hole, indicate which)

Tubing size 2 3/8" lined with PLASTIC (material) set in a

ARROW TYPE SL 2"X 4" (brand and model) packer at 790 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

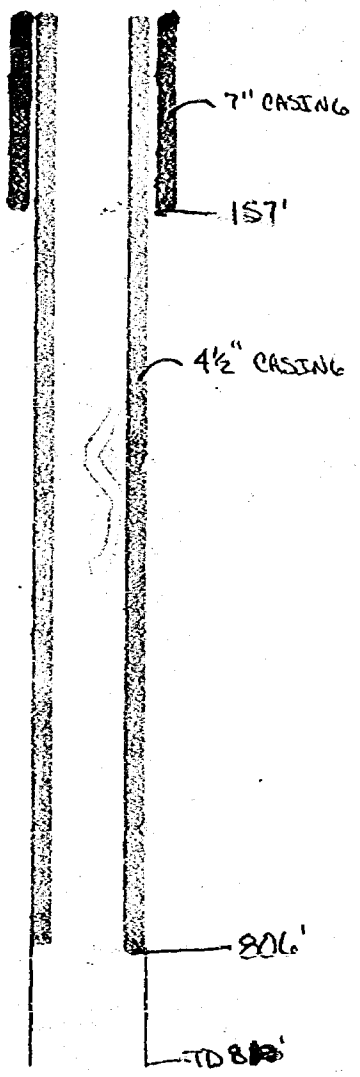
   If no, for what purpose was the well originally drilled? PRODUCER
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATION) LC-050797 (LEASE) WELL FED.

35 (WELL NO.) 1980' FNL + 2630 FEL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tubular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size 7" Cemented with 25 sx.

TOC _____ feet determined by _____

Hole size _____

Long string

Size 4½" Cemented with 60 sx.

TOC UNKNOWN feet determined by _____

Hole size 6 1/4"

Total depth 806

Injection interval

767 feet to 806 feet

(perforated or ~~open hole~~, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

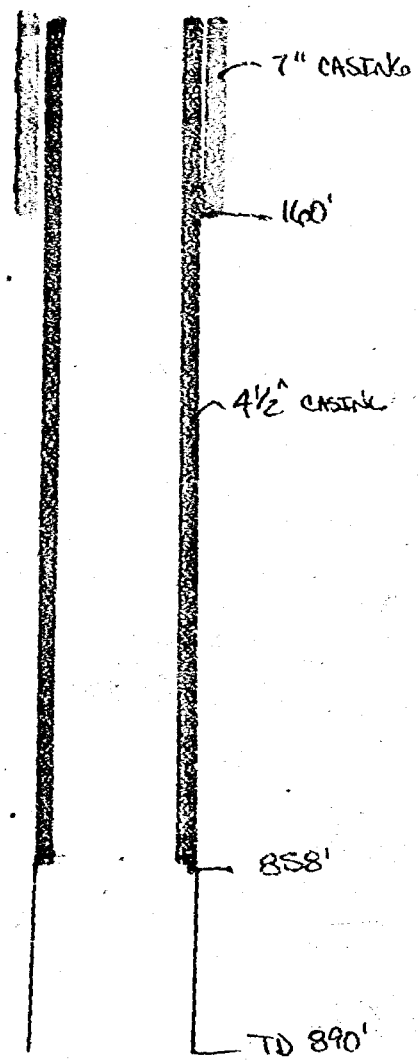
1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARGER, OIL, INC.	LC-050797	Wells Fed.		
OPERATOR	LEASE			
36	660' FNL & 1310' FEL	13	20S	28E
WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size 7" Cemented with 25 sx.

TOC _____ feet determined by _____

Hole size 8½"

Long string

Size 4½" Cemented with 50 sx.

TOC UNKNOWN feet determined by _____

Hole size 6¼"

Total depth 858'

Injection interval

858 feet to 881 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size _____ lined with _____ set in a

(material)

_____ packer at _____ feet

(brand and model)

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO

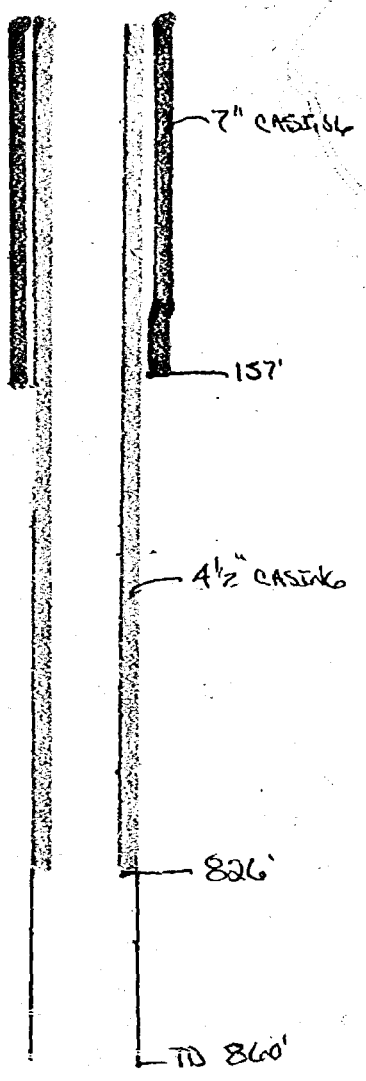
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATOR) | LC-050797 (LEASE) | WELLS FED

37 (WELL NO.) | 660' FNL & 2630' FEL (FOOTAGE LOCATION) | 13 (SECTION) | 20S (TOWNSHIP) | 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size 7" Cemented with 26 sx.

TOC _____ feet determined by _____

Hole size 8½"

Long string

Size 4½" Cemented with 100 sx.

TOC UNKNOWN feet determined by _____

Hole size 6¼"

Total depth 826'

Injection interval

832 feet to 854 feet

([redacted] or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a

_____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO

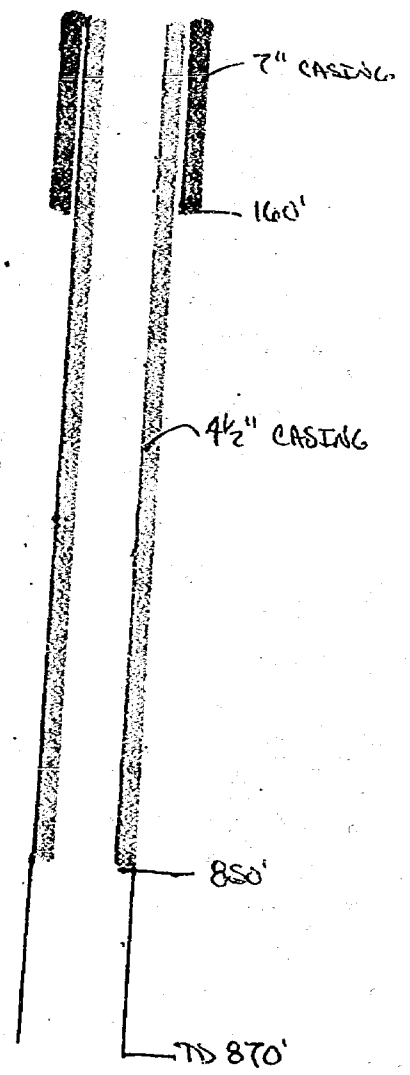
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER Oil, Inc. — OPERATOR; LC-050797 — LEASE; Wells Fed. — LEASE

29 — WELL NO.; 2630' FNL & 1980 FEL — FOOTAGE LOCATION; 13 — SECTION; 20S — TOWNSHIP; 28E — RANGE

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size 7" Cemented with 15 sx.

TOC _____ feet determined by _____

Hole size 8¼"

Long string

Size 4-1/2" Cemented with 60 sx.

TOC UNKNOWN feet determined by _____

Hole size 6¼"

Total depth 850'

Injection interval

850 feet to 863 feet

(~~perforated~~ or open-hole, indicate which)

Tubing size _____ lined with _____ (material) set in a _____ (brand and model) packer at _____ feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES
2. Name of Field or Pool (if applicable) RUSSELL
3. Is this a new well drilled for injection? ☐ Yes ☒ No

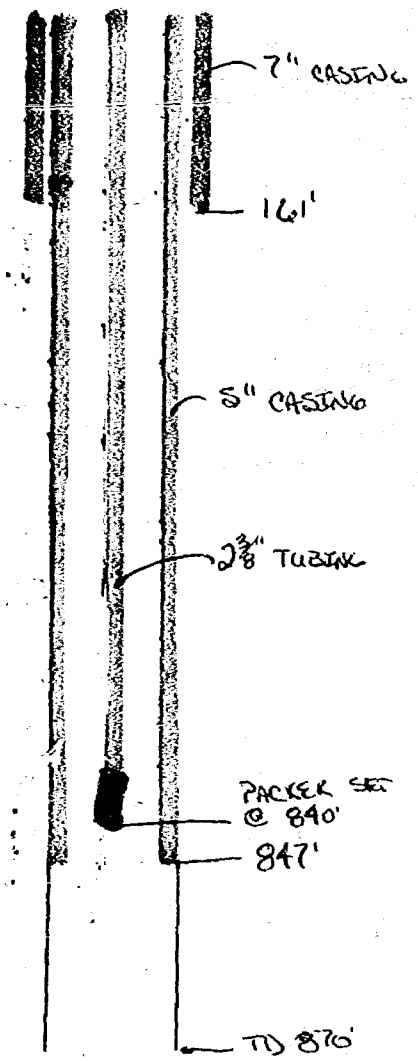
   If no, for what purpose was the well originally drilled? PRODUCER
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

OPERATOR	LEASE
Barber Oil, Inc.	LC-050797 Wells Fed.

WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
41	1310' FNL 1310' FEL	13	20S	28E

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size 7" Cemented with 15 sx.

TOC _____ feet determined by _____

Hole size 8½"

Long string

Size 5" Cemented with 60 sx.

TOC UNKNOWN feet determined by _____

Hole size 6 3/8"

Total depth 847'

Injection interval

844 feet to 866 feet
(perforated or open-hole, indicate which)

Tubing size 2 3/8 lined with PLASTIC (material) set in a

ARROW 2'X4" (brand and model) packer at 840 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No

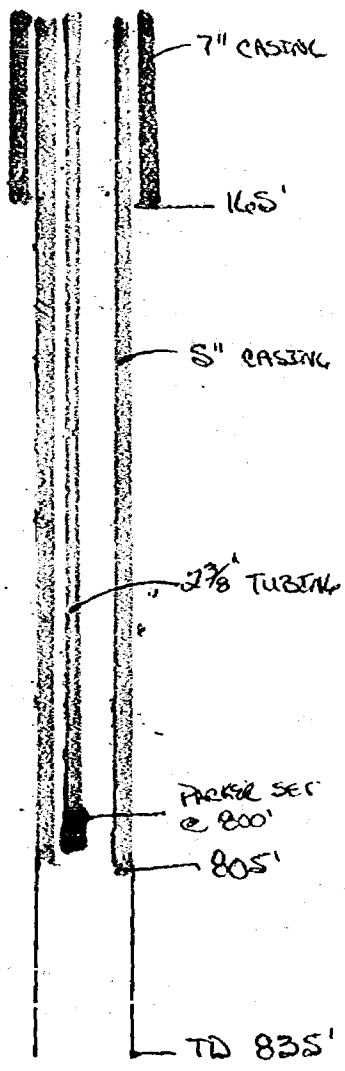
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

BARBER OIL, INC. (OPERATOR) LC-050797 (LEASE) WELLS FED.

12 (WELL NO.) 1330' FSL & 1330 FWL (FOOTAGE LOCATION) 13 (SECTION) 20S (TOWNSHIP) 28E (RANGE)

Schematic



Tabular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size 7" Cemented with 15 sx.

TOC _____ feet determined by _____

Hole size 8½"

Long string

Size 5" Cemented with 75 sx.

TOC UNKNOWN feet determined by _____

Hole size 6 3/8"

Total depth 805'

Injection interval

802 feet to 836 feet

(perforated or open-hole, indicate which)

Tubing size 2 3/8" lined with PLASTIC (material) set in a

ARROW 7"X 4" (brand and model) packer at 800 feet.

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) NO

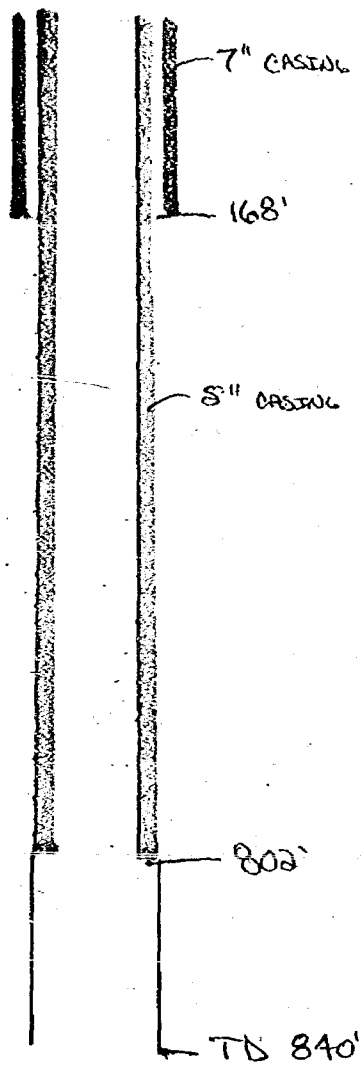
5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. NONE

INJECTION WELL DATA SHEET

OPERATOR	LEASE
Barber Oil, Inc.	LC-050797 Wills Fed.

WELL NO.	FOOTAGE LOCATION	SECTION	TOWNSHIP	RANGE
1S	1328 FNL + 2635' FEL	13	20S	28E

Schematic



Tubular Data

Surface Casing

Size _____" Cemented with _____ sx.

TOC _____ feet determined by _____

Hole size _____

Intermediate Casing

Size 7" Cemented with 15 sx.

TOC _____ feet determined by _____

Hole size 8½"

Long string

Size 5" Cemented with 50 sx.

TOC UNKNOWN feet determined by _____

Hole size 6⅜"

Total depth 802

Injection interval

810 feet to 834 feet
(perforated or open-hole, indicate which)

Tubing size _____ lined with _____ set in a
(material)

_____ packer at _____ feet.
(brand and model)

(or describe any other casing-tubing seal).

Other Data

1. Name of the injection formation YATES

2. Name of Field or Pool (if applicable) RUSSELL

3. Is this a new well drilled for injection? ☐ Yes ☒ No

   If no, for what purpose was the well originally drilled? PRODUCTION

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail (sacks of cement or bridge plug(s) used) No

5. Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. POOL

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

March 24, 1982

Barber Oil, Inc.
P.O. Box 1658
Carlsbad, NM 88220

ATTENTION: Robert S. Light

RE: Exception to Rule 705-A
for Injection Wells

Dear Sir:

Pursuant to your letter of March 4, 1982, requesting exception to Rule 705-A for your injection wells; the Oil Conservation Division (OCD) needs further information to be submitted. The information requested is as follows:

WELL DATA

The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

(a) Lease name: Well No.; location by Section, Township, and Range; and footage location within the section.

(b) Each casing string used with its size and weight setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.

(c) A description of the tubing to be used including its size, lining material, and setting depth.

(d) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

(e) The name of the injection formation and, if applicable, the field or pool name. Also list each formation penetrated and tops thereof.

(f) The injection interval and whether it is perforated or open-hole.

(g) State if the well was drilled for injection or, if not, the original purpose of the well.

(h) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.

(i) Give the depth to and name of the next higher and next lower oil or gas zone in the area of the well, if any.

(j) Attach appropriate logs and test data that were run that would substantiate mechanical integrity.

(k) Submit the date when each injection well was shut-in.

(l) Specify for each well, anticipated dates for resuming re-injection.

(m) Relate each injection well to corresponding Division Orders, Case Numbers, and administrative approval (WFX, PMX, SWD, and Storage), wnere applicable.

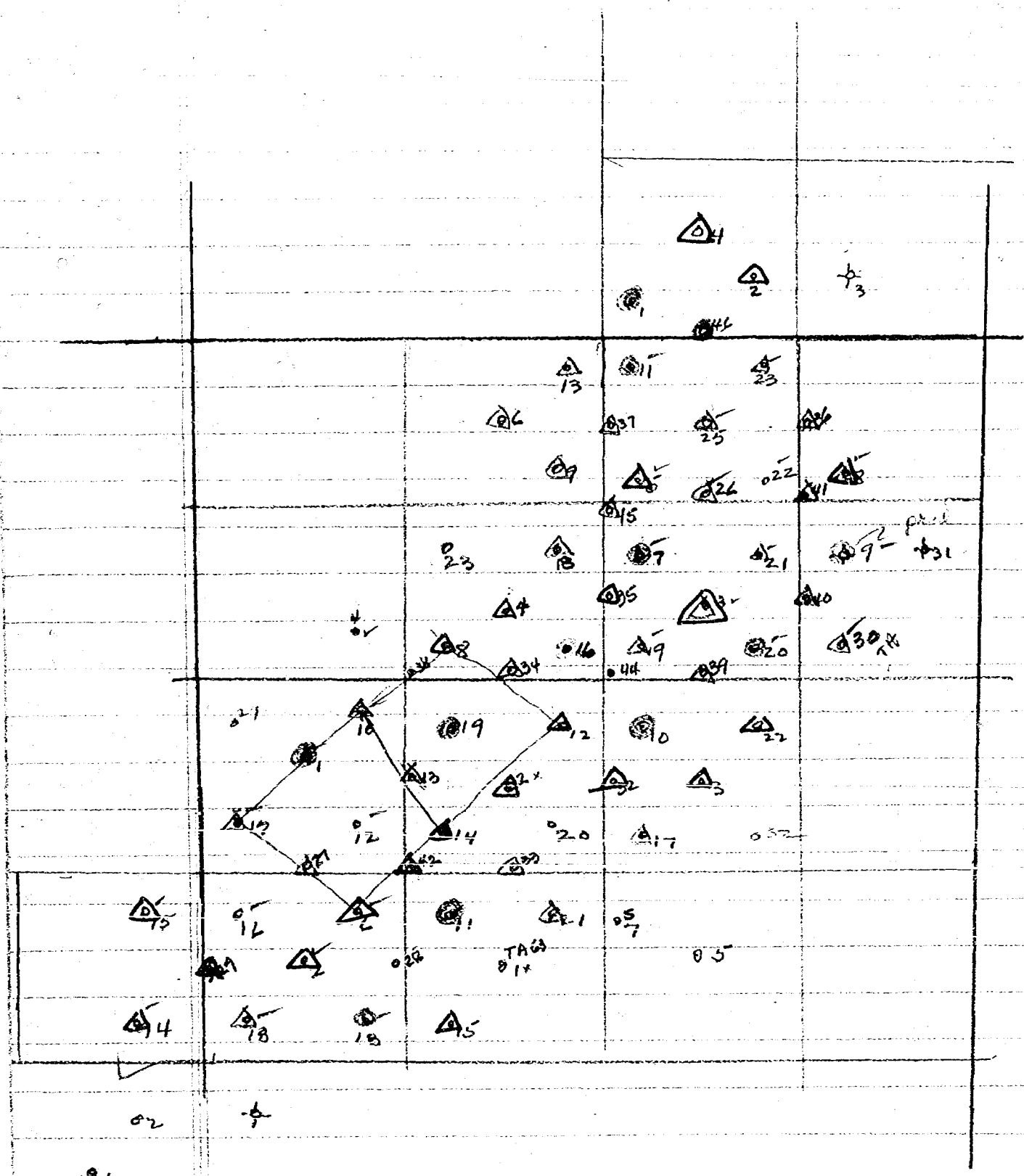
Enclosed is a Memo concerning Rule 705-A which might help. If you have any questions regarding this matter, please call me at (505) 827-2533.

Sincerely,

Oscar Simpson
Water Resource Specialist

OS/dp

cc: Hobbs District Office
Artesia District Office



Δ = injection wells as indicated by tabs on well files.

Δ = injection wells as indicated by Nov 75 staff report

⊕ = producing wells according to Nov 75 staff report

GOVERNOR
JACK M. CAMPBELL
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

P. O. BOX 2088
SANTA FE

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

LEGAL DIVISION
PHONE 827-2741

November 10, 1965

Mr. Dick Stamets
Geologist
Oil Conservation Commission
P. O. Drawer DD
Artesia, New Mexico

Re: Order No. R-263

Dear Dick:

In view of the language contained in the above order, it will not be necessary for the operator to obtain a WFX order prior to converting wells to injection on leases in the Russell Pool that were in existence at the time Order No. R-263 was issued. However, the operator will have to comply with all other Commission rules concerning the conversion of a well to water injection.

Very truly yours,

J. M. DURRETT, Jr.
Attorney

JMD/esr

RECEIVED
NOV 11 1965
O. C. C.
ARTESIA, OFFICE

Case 469
File

MAIN OFFICE OCC
1954 OCT 6 AM 9:04

NEIL H. WILLS
P. O. BOX 529
CARLSBAD, N. M.

October 4, 1954

Mr. W. B. Macey,
Oil Conservation Commission,
Box 871,
Santa Fe, New Mexico

Re: Case #469 - Neil H. Wills

Dear Sir:

In accordance with your letter of September 20, 1954, we are listing below the wells which have been converted to water injection wells in the Russell Pool:

Well No.	Location	Sec.	Twnsp.	Range	T.D.
19	2322' FNL & 2333'FEL	13	20	28	849'
43T17	1658' FSL & 2338'FEL	13	20	28	844'
44T18	1658' FNL & 2339'FWL	13	20	28	829'
47T21	959' FSL & 2339'FWL	13	20	28	820'
48T22	2322' FSL & 1669'FEL	13	20	28	869'

In the wells listed above, all tubing, rods, pumps, etc., have been removed. The wells were cleaned out to bottom, and packed with pea gravel from the bottom of the well up to the bottom of the 7" casing cemented in each well. Water lines were then connected to the 7" csg. at the top of each well, and all wells are now taking water at a rate and pressure satisfactory to the engineers in charge of the project.

Inasmuch as the injection was started at various times during the month of September, these new injection wells will appear on the Form C-120-B for the month of October, 1954.

Very truly yours,

Robert L. Bunnel

Robert L. Bunnel

RLB/pl
cc: L. A. Hanson
205 Carper Bldg.,
Artesia, N. M.

OIL CONSERVATION COMMISSION
P. O. BOX 871
SANTA FE, NEW MEXICO

September 20, 1954

COPY

Robert L. Bunnel
P. O. Box 529
Carlsbad, New Mexico

Re: Case 469-Neil H. Wills
Water Flood Project-
Russell Pool

Dear Mr. Bunnel:

Your letter of September 8, 1954, to Mr. Hanson, pertaining to the above captioned case and water flood project has been referred to me.

The only information which we desire would be the necessary information pertaining to the recompletion of ~~in-put~~ wells. In the event your productive volume approaches the present maximum daily allowable per 40 acre unit, it may be necessary for this office to approve administratively an increase in allowable. If at any time, this becomes necessary, please advise.

Very truly yours,

W. B. Macey
Secretary-Director

WBM:sk

cc: Mr. Hanson
Artesia, New Mexico

NEIL H. WILLS
P. O. BOX 529
CARLSBAD, N. M.

September 8, 1954

Mr. L. A. Hanson,
205 Carper Building,
Artesia, New Mexico

Dear Mr. Hanson:

After observing the results of our pilot flood in the Russell Pool, we have decided that a full flood of the entire field is warranted. We are now in the process of cleaning out and gravel packing additional water in-put wells and about the first of next week we will commence operations for a second water source well. If you desire any additional information other than the monthly Form 120-B, which we are submitting, please advise and we will be glad to furnish it.

It is our understanding that due to the peculiarities of a water flood project, we will not be hampered by a maximum allowable as the flood project reaches peak production.

Very truly yours,

Robert L. Bunnel

Robert L. Bunnel

RLB/pl

Memo

From

To Copy sent to
Neil Wills ——

2-11-53

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR THE
PURPOSE OF CONSIDERING:

CASE NO. 469
ORDER NO. R-263

THE MATTER OF THE APPLICATION
OF NEIL H. WILLS, ET AL, FOR APPROVAL
OF A SECONDARY RECOVERY PROGRAM (BY
WATER FLOODING) IN THE RUSSELL POOL,
EDDY COUNTY, NEW MEXICO, IN SECTIONS
12, 13 AND 14, TOWNSHIP 20 SOUTH, RANGE
28 EAST, NMPM.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. January 15, 1953, at Santa Fe, New Mexico, before the Oil Conservation Commission, hereinafter referred to as the "Commission."

NOW, on this 10th day of February, 1953, the Commission, a quorum being present, having considered the testimony adduced and the exhibits received at said hearing, and being otherwise fully advised in the premises;

FINDS:

(1) That due notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the petitioner's request to revert to secondary recovery methods by a water injection program will tend to prevent waste and should be granted upon the condition that said program be pursued in the manner outlined at said hearing.

(3) That a secondary recovery program by water injection is of an experimental nature in this particular pool, and periodic reports should be submitted to the Commission by the petitioner disclosing its acts and doings in the matter.

IT IS THEREFORE ORDERED:

That the applicant, Neil H. Wills et al, be and hereby is given the right to institute a secondary recovery program on leases in the Russell Pool by injecting water into the Yates sand reservoir.

IT IS FURTHER ORDERED, That petitioner submit quarterly reports to the Commission disclosing all of its acts and doings and setting forth therein the progress it has made by the adoption of its secondary recovery program.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Edwin L. Mechem, Chairman

E. S. Walker, Member

R. R. Spurrier, Secretary

S E A L

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR THE
PURPOSE OF CONSIDERING:

CASE NO. 469
ORDER NO. R-263

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OF NEIL H. WILLS, ET AL, FOR APPROVAL
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STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

Edwin L. Mechem, Chairman

E. S. Walker, Member

R. R. Spurrier, Secretary

S E A L

Original

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

TRANSCRIPT OF HEARING

CASE NO. 469

Henrickson's Reporting Service
2224 - 47th Street
Los Alamos, New Mexico

Original

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

TRANSCRIPT OF HEARING

CASE NO. 469

Henrickson's Reporting Service
2224 - 47th Street
Los Alamos, New Mexico

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

JANUARY 15, 1953

- -

In the Matter of:

The application of Neil H. Wills, et al, for approval of a secondary recovery program (by water flooding) in the Russell Pool, Eddy County, New Mexico, in Sections 12, 13 and 14, Township 20 South, Range 28 East, NMPM.

- -

TRANSCRIPT OF HEARING

BEFORE:

Hon. Ed Mechem, Governor and Chairman
Hon. R. R. Spurrier, Secretary and Member
Hon. E. S. Walker, Member

NEIL H. WILLS

having been first duly sworn, testified as follows:

WILLS - My name is Neil Wills. I am the operating partner in the lands in the Russell field of which we'd like to get permission from the Oil Conservation to flood.

The partnership owns all the lands in the field and possibly six or eight hundred acres of lands surrounding the field in almost all directions.

There are about fifty shallow wells in this field producing from the Yates Sand at a depth of oh, eight hundred to nine hundred feet.

And I have an engineering report prepared by the Cable Engineering Company of Wichita Falls, Texas which I'd like to submit to the Oil Conservation Commission and I think in this report, all the engineering facts are presented and I don't believe I can add any facts to the report. If there are any questions, I would be glad to try to answer them. I haven't very much of a case because we own all the lands and the lands, by the way, are all Federal lands.

The field is very small - - - -

WHITE - Then Mr. Wills, what you're asking the Commission to do is to read that report and issue their order based upon it?

WILLS - Yes, sir. That's right.

GRAHAM - Where will you obtain the water, Mr. Wills?

WILLS - We planned on obtaining the water from the top of the Capitan Reef Section, right below the Yates formation. It would be a very - I mean, that water would be very bad water, salty water but we

feel that it will be all right for flooding.

WHITE - What is the source of your water? And who will control it?

WILLS - Well, the water is from the wells we put into the Russell sand and it will be contolled by our engineer-in-charge.

GRAHAM - Is there underground water in that valley area?

WILLS - No, it's outside the area.

WHITE - What kind of packing are you going to use?

WILLS - Packing? Well, the present - the wells that will be incut wells, will be well packed. I don't understand the question. I'm not an engineer, I didn't do the engineering work on this.

WHITE - The answers to these questions will be in the report?

WILLS - I hope so.

MACEY - Mr. Wills, you are going to take the water out of the No. 5, is that correct?

WILLS - Or similar wells that we might obtain water from.

MACEY - They're all abandoned wells?

WILLS - That's right.

MACEY - You're going to perforate the strong section and then inject the - - -

WILLS - That's right. The water that we will obtain is about three hundred feet below the Russell Sand.

GRAHAM - What is the production of those wells, Mr. Wills? What do they do? They've failed, haven't they? What do you get out of them?

WILLS - We're making about two barrels per day per well. About 100 barrels a day for the field.

GRAHAM - What are your expectations? Will it materially increase?

WILLS - Well, the engineer says that if the flood is successful, we will get as much oil from the flood as we have already, which will be about a million barrels.

SPURRIER - Are there any other questions of this witness?

MACEY - What you plan to do is get a pilot program to start with -

WILLS - That's right.

MACEY - If it works out successfully, you intend to expand it?

WILLS - That's right. It will require about a year, according to the engineer, to tell. This plat here shows, in red, the outline of the acreage that we own. And you see, the field is right in the middle of it. There's a thousand acres, at least the field is about four hundred acres.

MACEY - Was this Cable Engineering Company who made this survey for you, were they able to cut any cores yet or is that something - - -

WILLS - The last hole I drilled on Number 26 is the only hole which we cored. And that was about two years ago. That's the only core information we have at that one well.

MACEY - And that's what you're basing your proposal - - -

WILLS - That's right.

MACEY - upon the facts that you got from there?

WILLS - That's right.

MACEY - They say the continuity is pretty uniform down there, isn't it? I mean, it has characteristics.

WILLS - Well, it's very shaley. Whether it will be successful, we

don't know. It's very shaley and it's not the best type of sand probably. But it's - - so much oil remains in place, that it seems like we should try something to get additional oil out. There's oil there - there's no question about it.

MACEY - There's a lot of Yates fields down in that area that if this were successful, the same thing would probably be incorporated with them.

WILLS - This is the only Yates Sand field.

MACEY - And the rest of them are lime?

WILLS - That's right. The most of the production around Carlsbad is from the base of the Yates in the lime. There are some Yates fields in Lea County but not very close to Russell.

SPURRIER - Mr. Wills, do you offer this exhibit in evidence?

WILLS - Yes.

SPURRIER - Without objection, it will be received. Are there any further questions? If not, the witness may be excused and the case will be taken under advisement. The next case on the docket is Case 470.

STATE OF NEW MEXICO)
)
COUNTY OF LOS ALAMOS)

I HEREBY CERTIFY that the foregoing and attached transcript of hearing on Case 469, before the Oil Conservation Commission, State of New Mexico, at Santa Fe, on January 15, 1953, is a true and correct record of the same to the best of my knowledge, skill and ability.

DATED at Los Alamos, New Mexico, this 16th day of January, 1953.

Reporter

Case 469

NEIL H. WILLS
P. O. BOX 529
CARLSBAD, N. M.

December 23, 1952

Mr. Bill Macey
Box 871
Santa Fe, New Mexico

Dear Mr. Macey:

Pursuant to our telephone conversation of the above date I am enclosing herewith a plat of the Russell Pool showing the proposed Water Flooding Project.

It is proposed to clean out the old Turner #5 well to an approximate depth of 900' as a source of water. For the pilot project the wells indicated in yellow on the map will be used. If the pilot project proves successful the wells indicated on the map in green will be converted to water input wells thereby expanding the Water Flood Project to include the entire field.

Work will be done on this Project under the supervision of the Cable Engineering Company of Wichita Falls, Texas.

Very truly yours,

Robert L. Bunnel

Robert L. Bunnel

RLB:mk
enc.

Case 469

COPY

NEIL H. WILLS

P. O. Box 529

Carlsbad, N. M.

COPY

Dec. 19, 1952

Mr. L. A. Hanson
Oil Conservation Commission,
Artesia, N. M.

Dear Mr. Hanson:

Enclosed herewith is a field map showing the proposed Water Flooding Plan of the Russell Pool.

The general outline of the Plan is as follows:

1. Initiate a pilot Water Flood incorporating 6 water input wells and 2 oil wells as shown on the map.

2. Recomplete the George Turner # 5 well in the 900 foot limestone as a source of flood water.

3. Expand the pilot Flood, if successful, to a field wide flood incorporating a 20 acre 5-spot spacing.

If your office has any other requirements to be met regarding the project please advise us so that we can get them taken care of as we would like to start the project about the first of the year.

Very truly yours,

Robert L. Bunnel

RLB:mk
enc.

SECTION 5. PER DIEM--RATES.--

A. Per diem shall be paid to public officers and employees only in accordance with the provisions of this section.

B. Except as provided in Subsections C through J of this section, per diem for in-state travel away from home and out-of-state travel by public officers and employees shall be computed as follows:

	REIMBURSEMENT			
LENGTH OF TRAVEL TIME	Column 1 In-State	Column 2 Special Municipalities In-State	Column 3 Out-of-state	Column 4 Special Areas Out-of-state
Less than 6 hours	None	None	None	None
6 hours or more but less than 12 hours	$ 9.00	$11.00	$13.00	$16.00
12 hours or more but less than 18 hours	$18.00	$22.00	$26.00	$32.00
18 hours or more but less than 24 hours	$27.00	$33.00	$39.00	$48.00
24 hours or more but less than 30 hours	$36.00	$44.00	$52.00	$64.00
for each additional 6 full hours	$ 9.00	$11.00	$13.00	$16.00

Per diem may be reimbursed in accordance with Column 4 to any public officer or employee for travel time outside the continental United States or to the metropolitan areas of Boston, New York City, Washington, D. C., Philadelphia, Dallas, Los Angeles, San Diego, San Francisco, Chicago or New Orleans; and in accordance with Column 2 for state officers and employees for travel time whose overnight destination is one of the following municipalities: Santa Fe, Taos, Farmington and Albuquerque.

22 ¢ car
private
35 ¢ private plane